BROWSER AUTOMATION USING PYTHON-SELENIUM

SANDEEP SURYAPRASAD

COURSE INDEX

USEFUL LINKS

Demo Websites for Practice

- http://demowebshop.tricentis.com/
- https://services.smartbear.com/samples/TestComplete14/smartstore/
- https://www.saucedemo.com

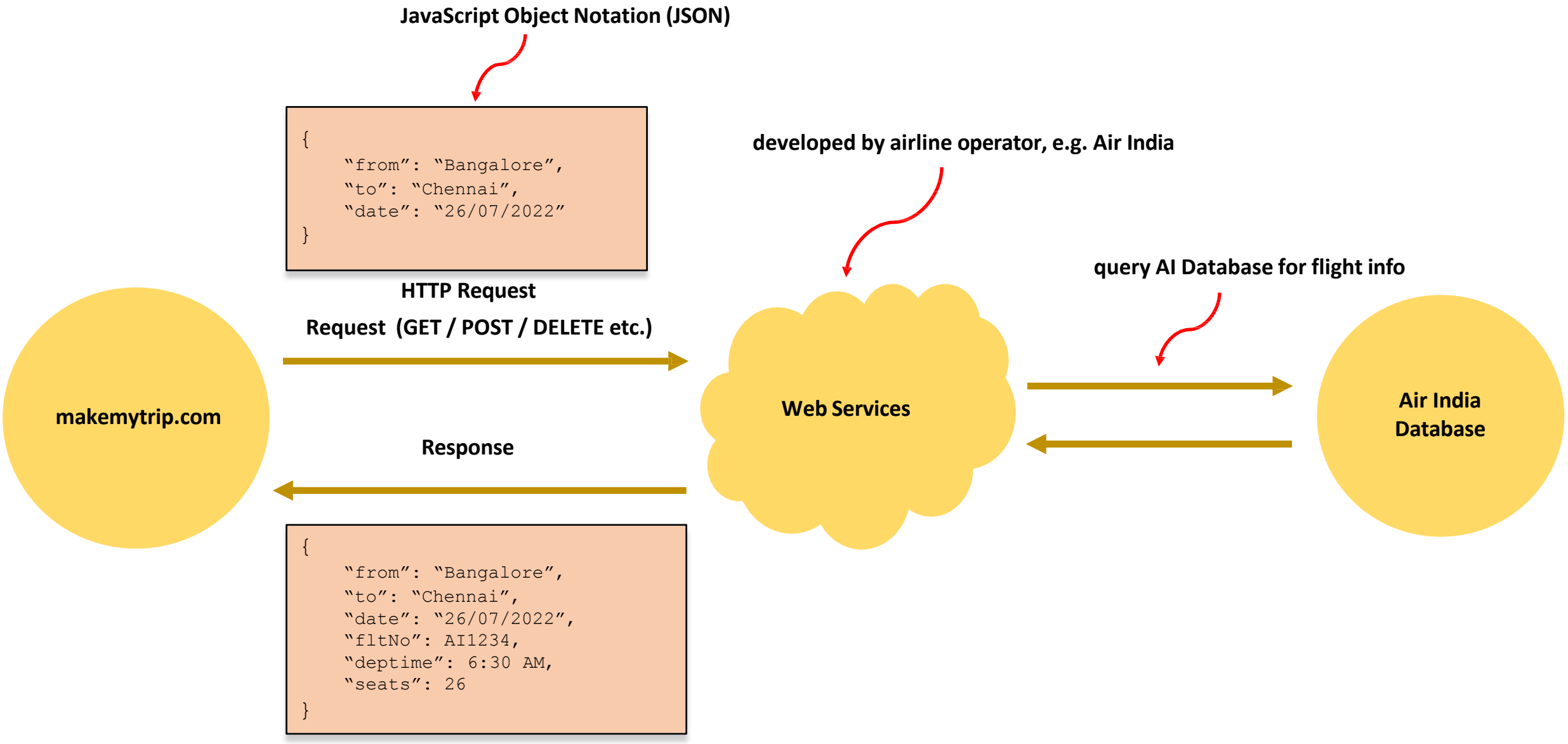
Selenium Documentation

- https://www.selenium.dev/documentation/en/

Webdriver Status

- https://chromium.googlesource.com/chromium/src/+/refs/heads/main/docs/chromedriver_status.md
- https://developer.apple.com/documentation/webkit/macos_webdriver_commands_for_safari_11_1_and_earlier

ONLINE FLIGHT RESERVATION



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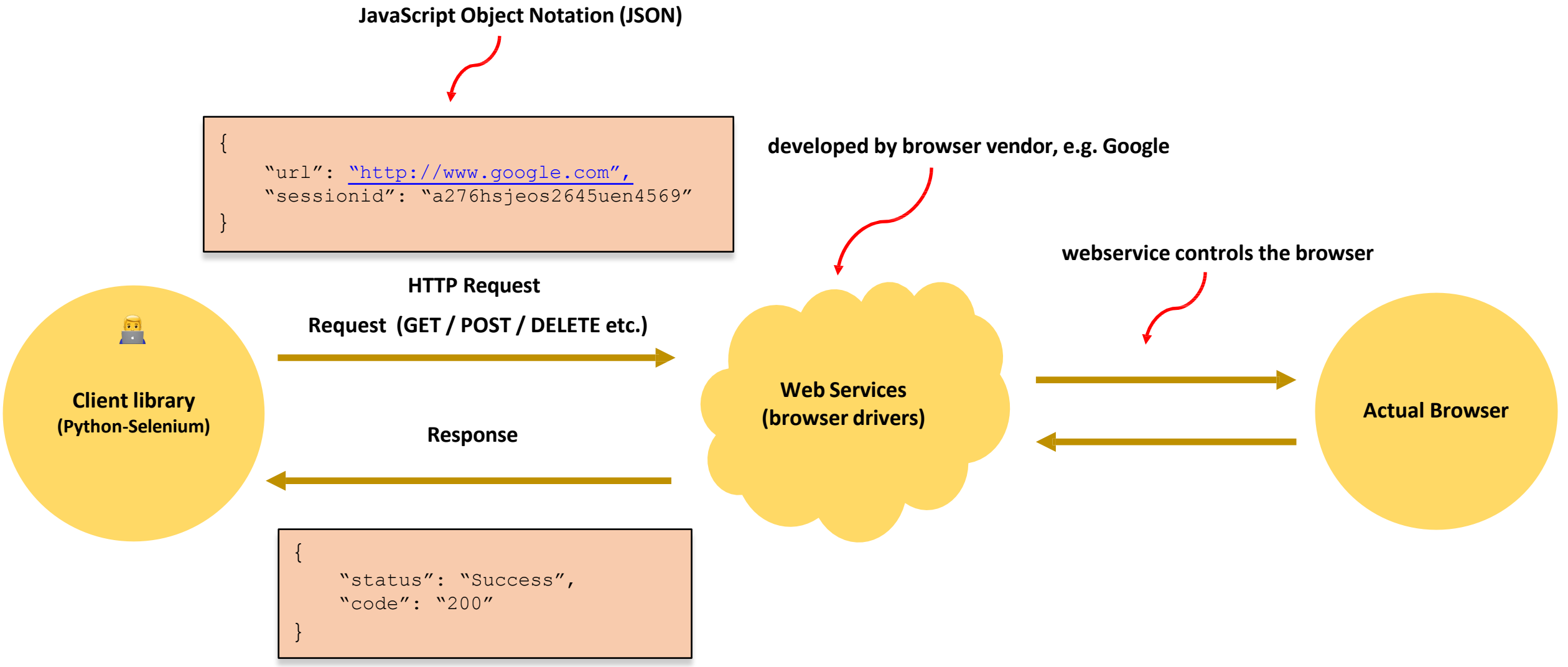
SELENIUM ARCHITECTURE

SELENIUM ARCHITECTURE



CLIENT LIBRARIES / LANGUAGE BINDINGS

Client libraries

- 👉 Selenium supports multiple languages such as Python, Java, C#, JavaScript, Ruby.
- 👉 Client libraries provide various methods to perform different browser actions. e.g. get, title, find_element
- 👉 As automation developers we call these methods from our development environment. e.g. VSCode
- 👉 Once we execute the script, the client libraries convert our code that we have written into a JSON (JavaScript Object Notation) format and sent as a request to Driver over HTTP.

BROWSER DRIVERS

Browser drivers

- Each browser has its own implementation of **"WebDriver" protocol** (mandatory services that need's to be implemented in order for selenium to interact with browser) called drivers.
- The browser drivers are responsible for controlling the actual browser's since the browser implementation details will be known only to the developer of driver.
- Each browser driver will be maintained by respective browser vendor. e.g. Chrome Driver is maintained by Google and Safari Driver is maintained by Apple.
- Each method in the client library is mapped to a specific web-service in the driver.
- The driver interprets the incoming request from the client and controls the actual browser.
- Once the browser operation is complete, the response is sent back to the client/client library by driver in JSON format.
- Client library interprets the JSON response and prints the response in readable format in the VSCode console.

SELENIUM BINARIES

Install selenium

```
pip install selenium
```

Browser drivers

Browser	Maintained By	Download Link
CHROME	GOOGLE	DOWNLOAD
SAFARI	APPLE	BUILT IN
FIREFOX	MOZILLA	DOWNLOAD
EDGE	MICROSOFT	DOWNLOAD

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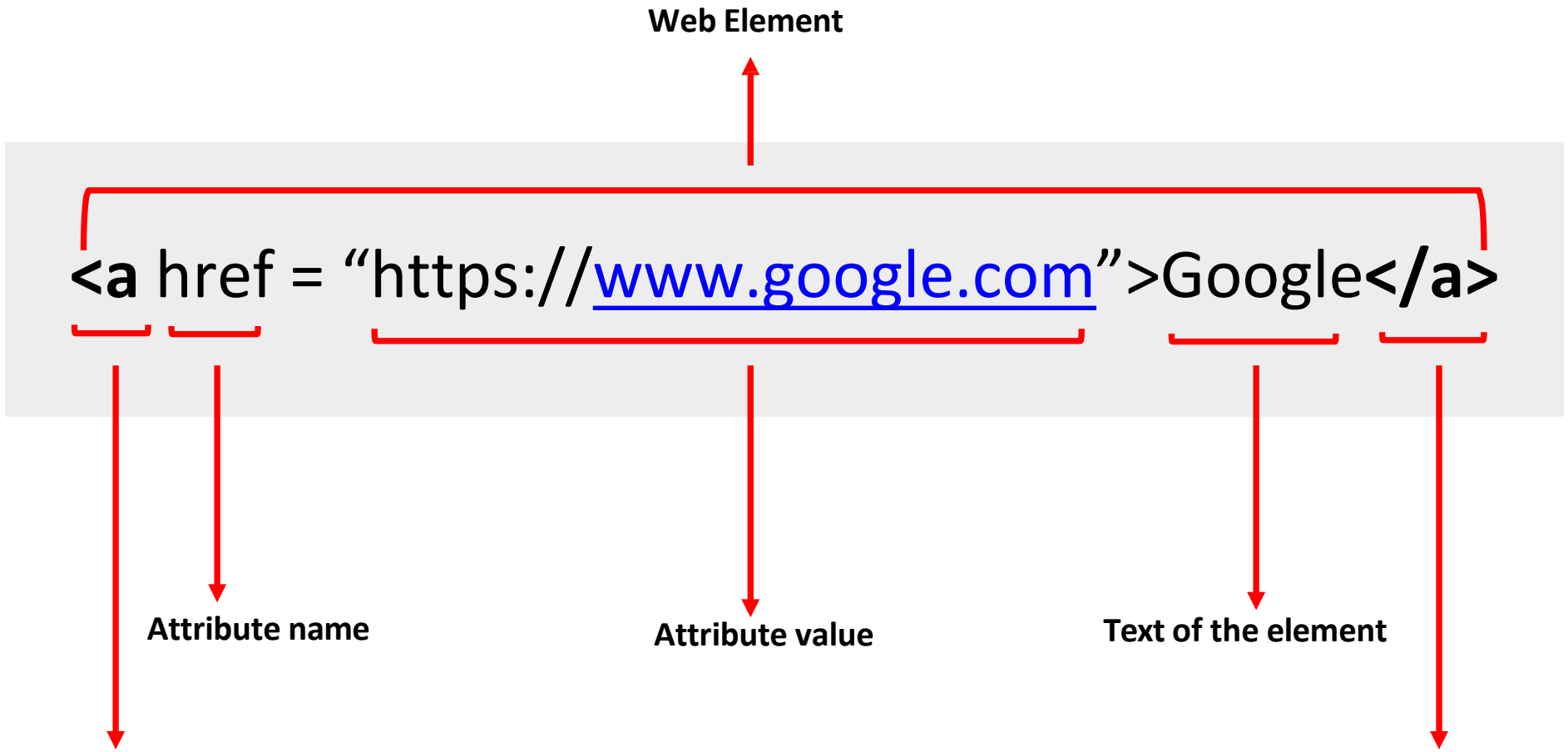
HTML FUNDAMENTALS

HTML

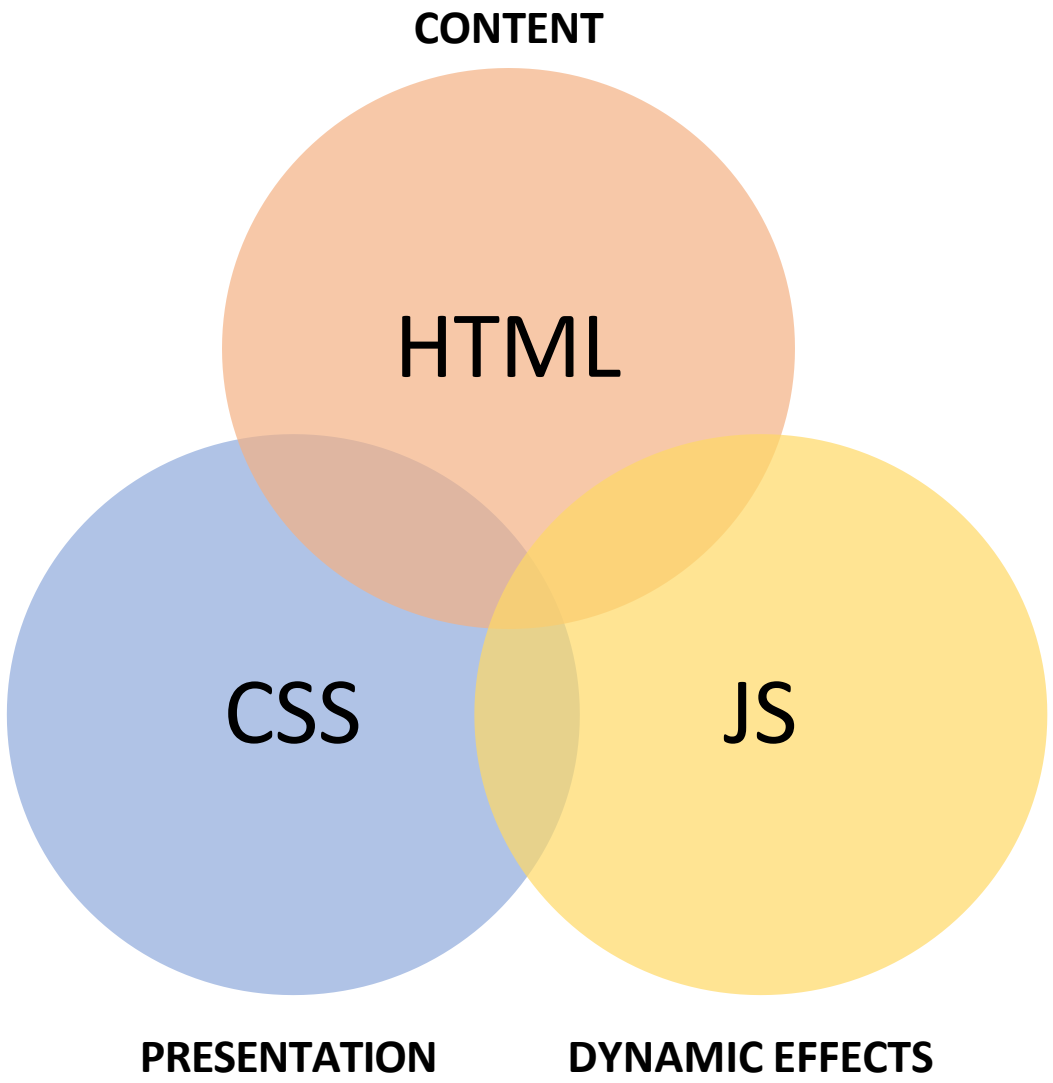
HTML

- **H**yper **T**ext **M**arkup **L**anguage
- HTML is a markup language that web developers use **to structure and design the content** of a webpage (HTML is not a programming language)
- HTML consists of **elements (web elements)** that describe different types of contents like links, headings, images, text boxes, radio buttons, check-boxes etc.
- Browser understands HTML and **renders HTML code as websites**

HTML ELEMENT



3 LANGUAGES OF FRONT-END



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BROWSER NAVIGATION

LAUNCHING DIFFERENT BROWSERS

PATH OF DRIVER EXECUTABLE

```
from selenium import webdriver

driver = webdriver.Chrome("./chromedriver")
```

CREATING AN INSTANCE OF CHROME BROWSER

```
from selenium import webdriver

driver = webdriver.Firefox("./geckodriver")
```

CREATING AN INSTANCE OF FIREFOX BROWSER

```
from selenium import webdriver

driver = webdriver.Safari()
```

CREATING AN INSTANCE OF SAFARI BROWSER

PATH OF SAFARI DRIVER WILL BE AUTOMATICALLY TAKEN FROM THE PATH /USR/BIN

COMMON BROWSER ACTIONS

```
from selenium import webdriver
driver = webdriver.Chrome("./chromedriver")
driver.get("http://www.google.com")
```

LAUNCH URL

```
from selenium import webdriver
driver = webdriver.Chrome("./chromedriver")
driver.get("http://www.google.com")
driver.maximize_window()
```

MAXIMIZES THE BROWSER

```
from selenium import webdriver
driver = webdriver.Chrome("./chromedriver")
driver.get("http://www.google.com")
driver.minimize_window()
```

MINIMIZES THE BROWSER

```
from selenium import webdriver
driver = webdriver.Chrome("./chromedriver")
driver.get("http://www.google.com")
driver.refresh()
```

REFRESH THE BROWSER

COMMON BROWSER ACTIONS

```
from selenium import webdriver
driver = webdriver.Chrome("./chromedriver")
driver.get("http://www.google.com")
current_title = driver.title
print(current_title)
```

FETCHES THE TITLE OF THE WEBPAGE

```
from selenium import webdriver
driver = webdriver.Chrome("./chromedriver")
driver.get("http://www.google.com")
url = driver.current_url
print(url)
```

FETCHES THE CURRENT URL OF THE WEBPAGE

```
from selenium import webdriver
driver = webdriver.Chrome("./chromedriver")
driver.get("http://www.google.com")
driver.quit()
```

CLOSES THE CURRENT BROWSER SESSION INCLUDING ANY POP-UP WINDOWS OPENED BY SELENIUM

```
from selenium import webdriver
driver = webdriver.Chrome("./chromedriver")
driver.get("http://www.google.com")
driver.close()
```

CLOSES THE CURRENT BROWSER SESSION, BUT DOES NOT CLOSE ANY POP-UP WINDOWS OPENED BY SELENIUM

BROWSER AUTOMATION USING PYTHON-SELENIUM

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LOCATING ELEMENTS

`find_element`

- `find_element` method returns a web element if the element is found in the DOM/HTML.
- If no element is found, `find_element` method throws "`NoSuchElementException`"
- If there are multiple elements matching the same locator, `find_element` method returns the first matching element from the DOM.

LOCATING ELEMENTS

- In order for selenium to identify elements on the webpage, selenium makes uses of 8 different locators to identify the objects.
- There are 8 different built-in element location strategies in Webdriver

Locator	Description
name	Locates elements whose NAME attribute matches the search value
id	Locates elements whose ID attribute matches the search value
link text	Locates anchor elements (link) whose visible text matches the search value
partial link text	Locates anchor elements (link) whose visible text contains the search value. If multiple elements are matching, only the first one will be selected.
css selector	Locates elements matching a CSS selector
class name	Locates elements whose class name contains the search value (compound class names are not permitted)
xpath	Locates elements matching an XPath expression
tag name	Locates elements whose tag name matches the search value

CSS SELECTOR

CSS Selector

- In CSS, selectors are used to target the HTML elements on our web pages that we want to style.
- It is a pattern of elements and other terms that tell the browser which HTML elements should be selected to have the CSS property values inside the rule applied to them. The element or elements which are selected by the selector are referred to as the subject of the selector.

General Syntax

```
HTMLTAG[attribute='attribute_value']
```

Examples

```
a[class='ico-register']
input[id='gender-male']
input[name='FirstName']
```

XPATH

Xpath

- Xpath is defined as XML path or path of the element in HTML DOM structure. It is a syntax or language for finding any element on the web page using the XML path expression.
- Xpath is used to find the location of any element on a webpage using HTML DOM structure.
- Xpath allows you to navigate through HTML DOM structure.
- XPath helps selenium to find elements that are not found by locators such as ID, class, or name.

General Syntax

```
//HTMLTAG[@attribute='value']
```

XPATH

Types of Xpath

- 👉 **Absolute** Xpath
- 👉 **Relative** Xpath

Absolute Xpath

- 👉 Traversing the absolute path of the element in the DOM Structure. The disadvantage of absolute
- 👉 xpath is that if there are any changes made in the path of the element then the Xpath fails.
- 👉 Absolute Xpath starts with **`forward slash (/)`**, meaning immediate child

Example

```
/html/body/div[1]/div/div[2]/span/input
```

XPATH

Relative Xpath

👉 Relative Xpath starts with **double forward slash (//)**, meaning the element can be searched any where in the webpage

Examples

```
//a[@class='ico-register’]
//input[@id='newsletter-email’]
//input[@value='M']
```

XPATH

text()

In Xpath expression, with **`text()`** function, we find the element with the exact **text match.**

Examples

```
//a[text()='Register']
//a[text()='Log in']
//a[text()='Twitter']
```

XPATH

contains()

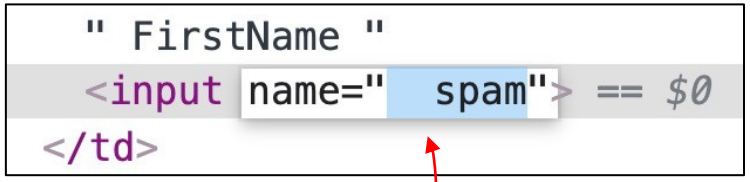
- 👉 `contains()` function is useful when we want to match the **value of any attribute partially**.
- 👉 It can be used when the value of any attribute changes dynamically.
- 👉 It is also used to match an element if the attribute value has **leading and/or trailing white spaces**.

Examples

```
//a[contains(text(),'Python Jobs')]
```

LINK TEXT HAS WHITE SPACES


```
//input[contains(@name,'spam')]
```



VALUE OF NAME ATTRIBUTE HAS WHITE SPACES

XPATH

indexing

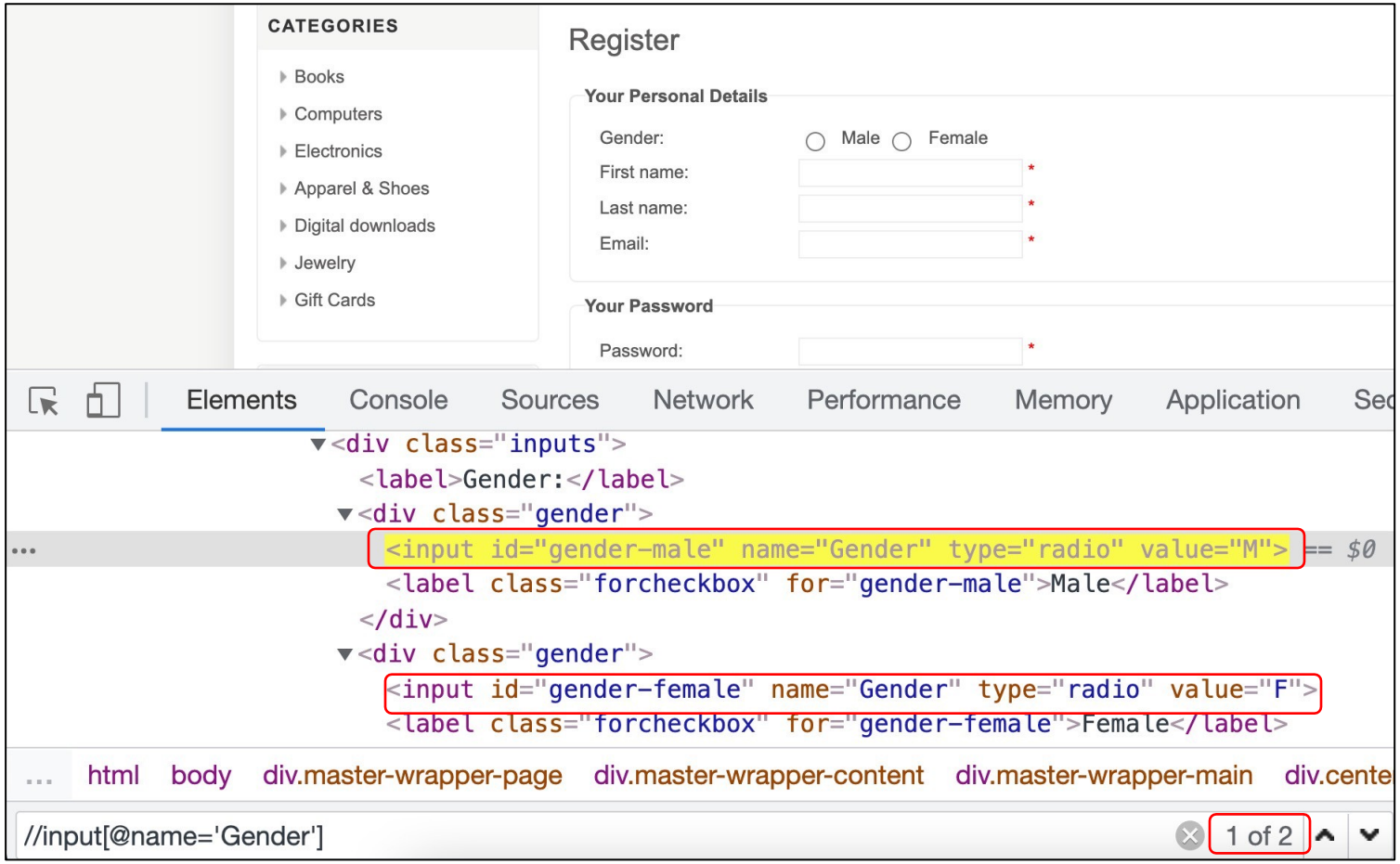
The xpath expression **//input[@name='Gender']** matches with two elements on the webpage. (**Radio button** corresponding to "**Male**" and **Radio button** corresponding to "**Female**")

In-order to identify the radio button corresponding to "**Male**", we need to index the xpath as below

(//input[@name='Gender'])[1]

In-order to identify the radio button corresponding to "**Female**", we need to index the xpath as below

(//input[@name='Gender'])[2]



XPATH

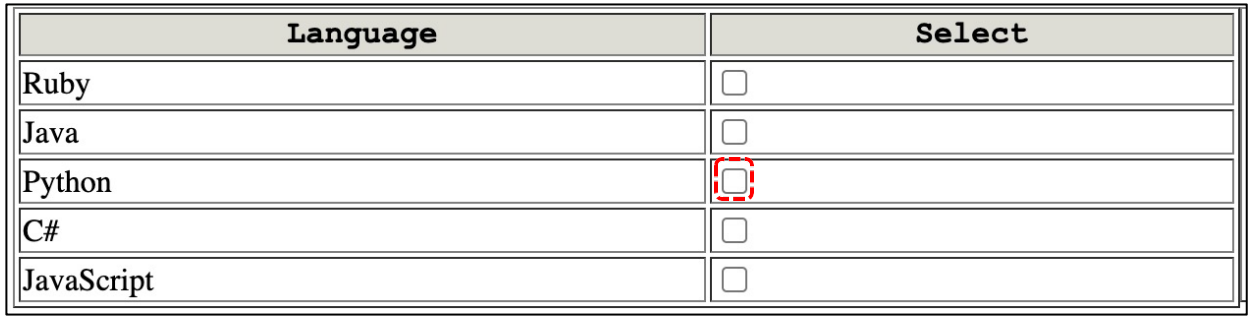
XPATH OF CHECKBOX CORRESPONDING TO ROW “**PYTHON**”, “**JAVA**”, “**JAVASCRIPT**”, “**RUBY**”

```
//td[text()='Python']/..//input[@name='download']
```

```
//td[text()=Java']/..//input[@name='download']
```

```
//td[text()=JavaScript']/..//input[@name='download']
```

```
//td[text()=Ruby']/..//input[@name='download']
```



Language	Select
Ruby	☐
Java	☐
Python	☐
C#	☐
JavaScript	☐

DYNAMIC XPATH

```python
from selenium import webdriver
from time import sleep

driver = webdriver.Chrome("./chromedriver")
driver.get("file:///Users/sandeep/Desktop/demo-html/demo.html#")
driver.maximize_window()
sleep(3)

# Checking all the checkboxes using dynamic xpath
languages = ['Ruby', 'Java', 'Python', 'C#', 'JavaScript']
for language in languages:
    # Dynamic xpath
    _xpath = f"//td[text()='{language}']/..//input[@name='download']"
    driver.find_element_by_xpath(_xpath).click()
    sleep(1)
```

XPATH

XPATH OF "**RELEASE NOTES**" LINK OF PYTHON RELEASE VERSION **3.9.4**

```
//a[text()='Python 3.9.4']/../..//a[text()='Release Notes']
```

XPATH OF "**RELEASE NOTES**" LINK OF PYTHON RELEASE VERSION **3.9.5**

```
//a[text()='Python 3.9.5']/../..//a[text()='Release Notes']
```

https://www.python.org/downloads/

Release version	Release date		Click for more
Python 3.9.6	June 28, 2021	Download	Release Notes
Python 3.8.11	June 28, 2021	Download	Release Notes
Python 3.7.11	June 28, 2021	Download	Release Notes
Python 3.6.14	June 28, 2021	Download	Release Notes
Python 3.9.5	May 3, 2021	Download	Release Notes
Python 3.8.10	May 3, 2021	Download	Release Notes
Python 3.9.4	April 4, 2021	Download	Release Notes
Python 3.8.9	April 2, 2021	Download	Release Notes

XPATH

XPATH OF "**ADD TO CART**" BUTTON OF "**HEALTH**", "**FICTION**" , "**COMPUTING AND INTERNET**" BOOKS

```
//a[text()=Health']/../..//input[@value='Add to cart']
```

```
//a[text()='Fiction']/../..//input[@value='Add to cart']
```

```
//a[text()='Computing and Internet']/../..//input[@value='Add to cart']
```

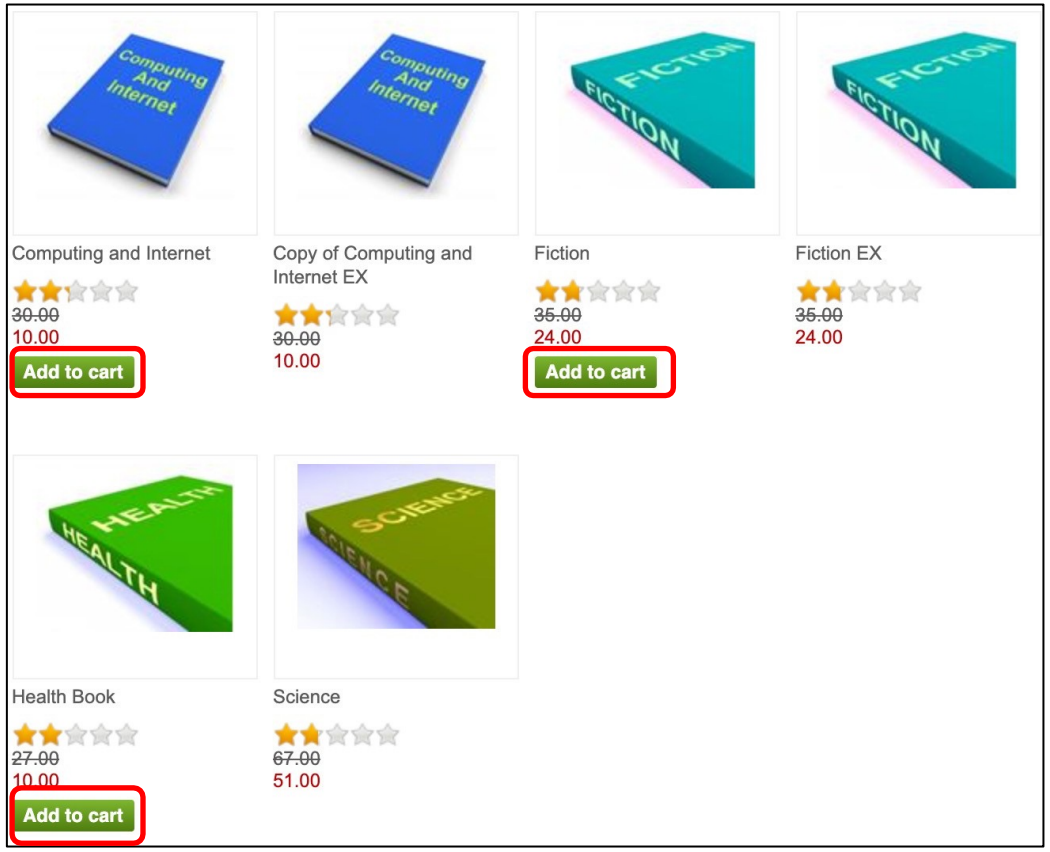
DYNAMIC XPATH

```python
from selenium import webdriver
from time import sleep

driver = webdriver.Chrome("./chromedriver")
driver.get("http://demowebshop.tricentis.com/books")
sleep(5)
# list of books that needs to be added to the cart
books = ["Health Book", "Fiction", "Computing and Internet"]

for book in books:
    # Dynamic Xpath
    _xpath = f"//a[text()='{book}']/../..//input[@value='Add to cart']"
    print(_xpath)
    driver.find_element_by_xpath(_xpath).click()
    sleep(2)
```

http://demowebshop.tricentis.com/books



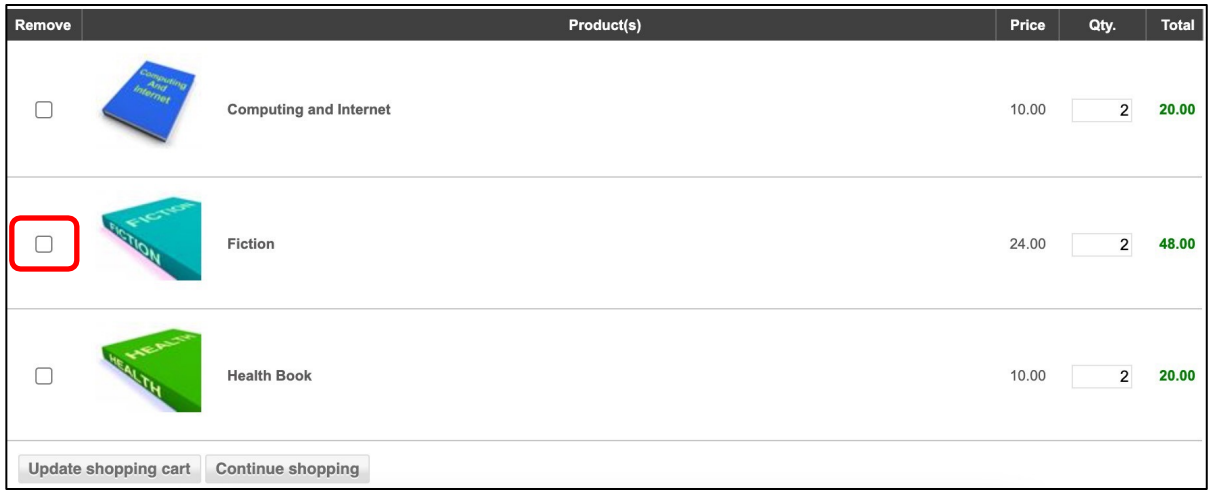
XPATH

XPATH PATH OF CHECKBOX CORRESPONDING TO BOOK “**FICTION**” IN DEMOWEBSHOP

```
//a[text()='Fiction']/../..//input[@type='checkbox']
```

```
//a[text()='Health Book']/../..//input[@type='checkbox']
```

http://demowebshop.tricentis.com/



XPATH

XPATH OF RADIO BUTTON CORRESPONDING TO RATING "**GOOD**", "**EXCELLENT**", "**POOR**", "**VERY BAD**" IN DEMOWEBSHOP

```
//label[text()='Good']/..//input[@type='radio']
```

```
//label[text()=Excellent']/..//input[@type='radio']
```

```
//label[text()=Poor']/..//input[@type='radio']
```

```
//label[text()=Very bad']/..//input[@type='radio']
```

DYNAMIC XPATH

http://demowebshop.tricentis.com/


```python
from selenium import webdriver
from time import sleep

driver = webdriver.Chrome("./chromedriver")
driver.get("http://demowebshop.tricentis.com/")
driver.maximize_window()
sleep(5)
# List of all different ratings
ratings = ["Excellent", "Good", "Poor", "Very bad"]
# Selects each radio button one-by-one
for rating in ratings:
    # Dynamic Xpath
    _xpath = f"//label[text()='{rating}']/..//input[@type='radio']"
    driver.find_element_by_xpath(_xpath).click()
    sleep(1)
```

XPATH

VALIDATE THE **ACTUAL PRICES** OF ALL THE **BOOKS** AGAINST THE **EXPECTED PRICE**

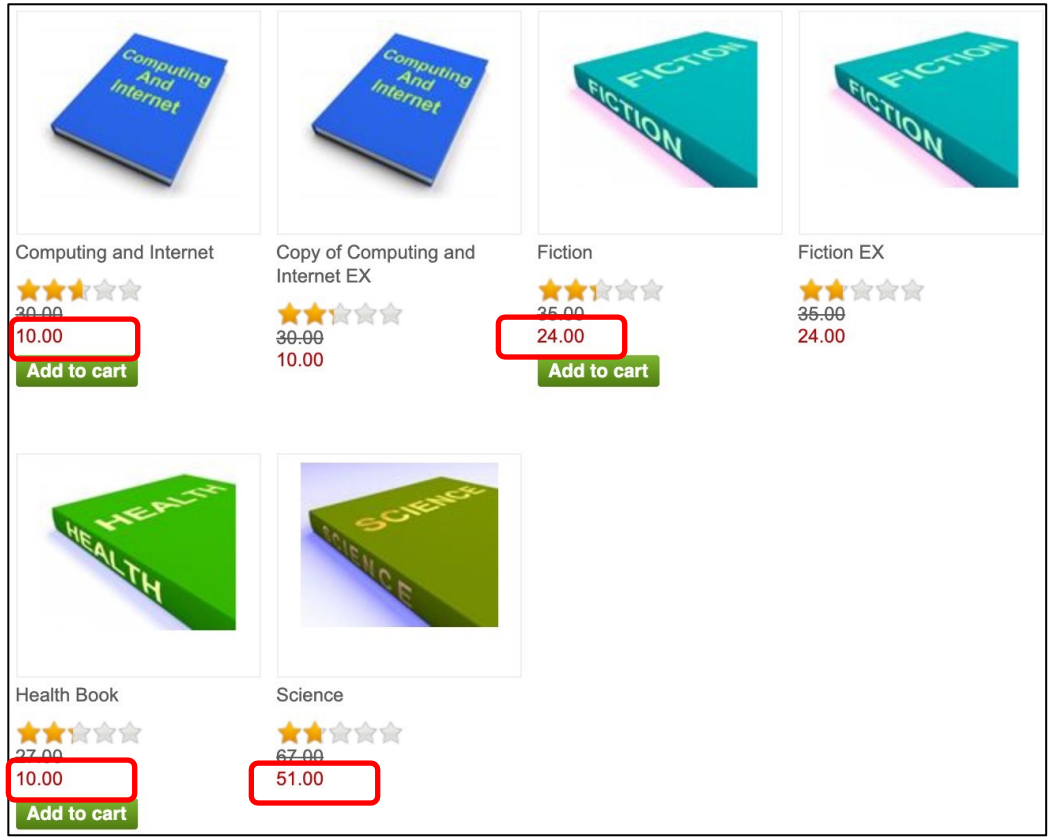
http://demowebshop.tricentis.com/books

```python
from selenium import webdriver
from time import sleep

driver = webdriver.Chrome("./chromedriver")
driver.maximize_window()
driver.get("http://demowebshop.tricentis.com/books")
sleep(5)

# Reference dictionary Maintaining the book name and expected cost.
expected_prices = {"Science": 51.00, "Health Book": 10.00, "Computing and Internet": 10.00, "Fiction": 24.00 }

for book, expected_price in expected_prices.items():
    _xpath = f"//a[text()='{book}']/../..//span[@class='price actual-price']"
    # reading the actual price that is displayed in the application
    actual_price = driver.find_element_by_xpath(_xpath).text
    # Compare expected price with the actual price that you have read from the application
    if float(actual_price) == expected_price:
        print("PASS")
    else:
        print("FAIL")
        print(f"The actual price of {book} book is {actual_price} and the expected price is {expected_price}")
```



XPATH

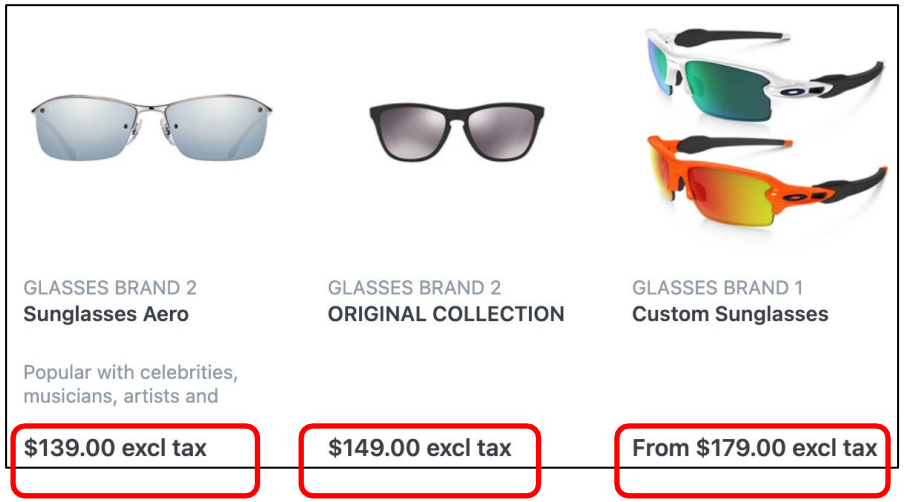
VALIDATE THE **ACTUAL PRICES** OF ALL THE GADGETS AGAINST THE **EXPECTED PRICE**

```
from selenium import webdriver
from time import sleep
driver = webdriver.Chrome("./chromedriver")
driver.get("http://demowebshop.tricentis.com/")
sleep(5)
# dictionary with Gadget name and its expected price
expected_prices = { "$25 Virtual Gift Card": 25.00,
                    "14.1-inch Laptop": 1590.00,
                    "Build your own cheap computer": 800.00,
                    "Build your own computer": 1200.00,
                    "Build your own expensive computer": 1800.00,
                    "Simple Computer": 800.00
                  }
# Iterate through the dictionary, get the gadget name and its corresponding expected prices.
for gadget, price in expected_prices.items():
    _xpath = f"//a[text()='{gadget}']/../..//span[@class='price actual-price']"
    actual_price = driver.find_element_by_xpath(_xpath).text
    # Compare actual and expected prices, print "PASS" or "FAIL"
    # Before comparing, typecast the actual_price which is read from the application to float()
    # Since actual price which is returned (by text property) will be a string.
    if float(actual_price) == price:
        print('PASS')
    else:
        print('FAIL')
    # You can as well assert the actual and expected prices
    # assert float(actual_price) == price
```

http://demowebshop.tricentis.com/

XPATH

GET THE **PRICE TAG** OF ALL THE SUN-GLASSES



https://services.smartbear.com/samples/TestComplete14/smartstore/sunglasses

```python
from selenium import webdriver
from time import sleep
import re

driver = webdriver.Chrome("./chromedriver")
driver.get("https://services.smartbear.com/samples/TestComplete14/smartstore/sunglasses")
driver.maximize_window()
sleep(5)

# Dictionary with sun-glass name and its expected prices
sun_glasses =  {"ORIGINAL COLLECTION": 149.00, "Custom Sunglasses": 179.00, "Sunglasses Aero": 139.00}

for glass, expected_price in sun_glasses.items():
    _xpath = f"//span[text()='{glass}']/../../..//span[@class='art-price']"
    actual_price = driver.find_element_by_xpath(_xpath).text
    actual_price = re.findall(r"\d+\.\d+",actual_price)
    if float(actual_price[0]) == expected_price:
        print("PASS")
    else:
        print('FAIL')
```

XPATH

READING **PRICE** FROM DYNAMIC TABLE

Name	Volume	Price
AAPL	50	0.00206
MSFT	10	0.05569
AA	20	0.22092
FB	30	0.22429

VALUES CHANGING DYNAMICALLY

```
from selenium import webdriver
from time import sleep

driver = webdriver.Chrome("./chromedriver")
driver.get("file:///Users/sandeep/Desktop/demo-html/demo.html")
sleep(5)

companies = ['AAPL', 'MSFT', 'AA', 'FB']

# Print the headers (company names)
for company in companies:
    print(f"{company:>15}", end='')

# print an empty line after headers
print()
print('-'*65)

# while loop to monitor the share price every 5 seconds
while True:
    for company in companies:
        share_price = driver.find_element("xpath", f"//td[text()='{company}']/..//td[3]").text
        print(f"{share_price:>15}", end='')
    print()
    sleep(5)
```

XPATH

Parent-Child relationship

- `//input` matches all the input elements in the entire webpage
- `//div[@name='login']//input` matches **all the input elements** under the division(div) "login"
- `//div[@name='login']/input` matches all the input elements which are **immediate children** of division "login"

- **Double forward slash "//" denotes any child.**
- **Single forward slash "/" denotes immediate child.**

```
<html>

<body>
    <div name="login">
        <input type="text"></input> <br>
        <span name="google">
            <input type="checkbox"></input> <br>
            <a href="http://yahoo.com">Yahoo</a> <br>
        </span>
        <input type="radio"></input> <br>
    </div>

    <div name="logout">
        <input type="text"></input> <br>
        <span name="apple">
            <input type="checkbox"></input> <br>
            <a href="http://google.com">Google</a> <br>
        </span>
    </div>
</body>

</html>
```

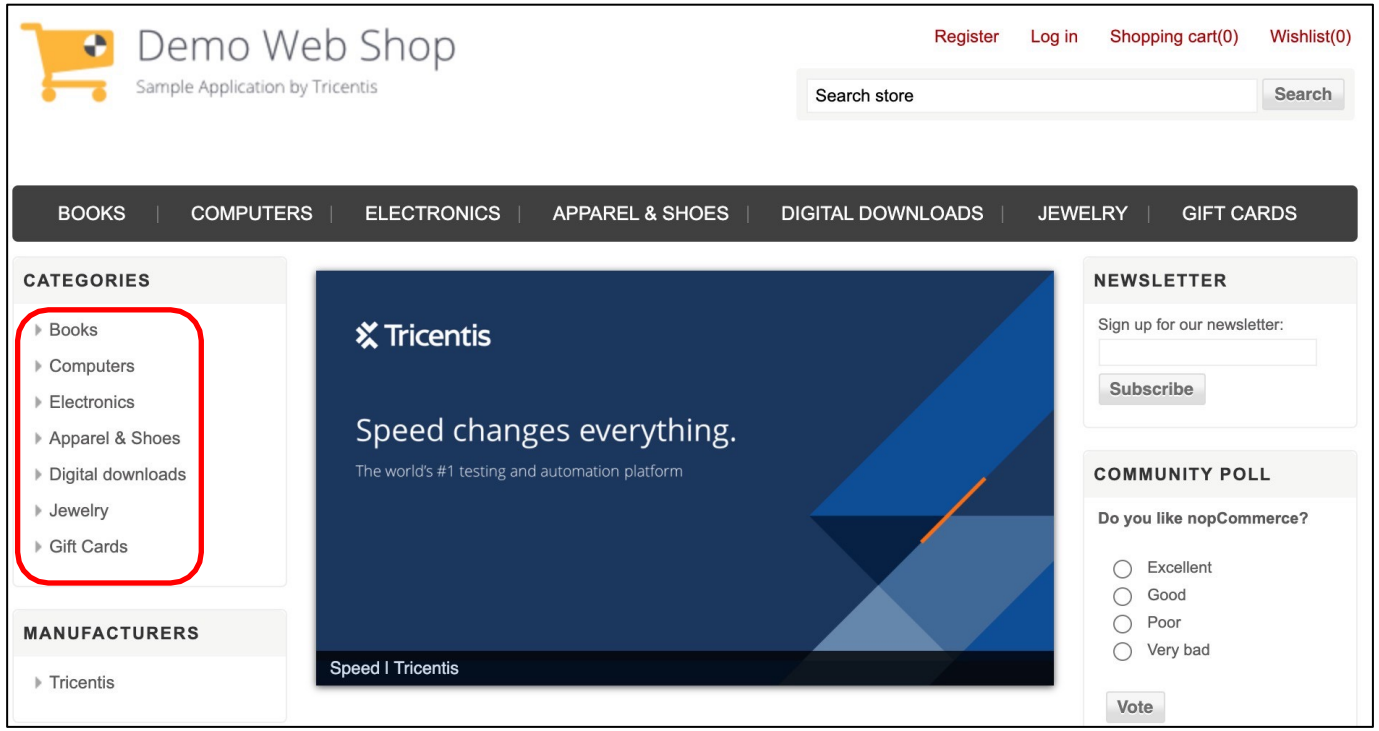
XPATH (Parent-Child relationship)

GET THE LINK TEXT OF ALL LINKS PRESENT IN **LEFT NAVIGATION BAR** IN DEMOWEBSHOP WEBPAGE

```
from selenium import webdriver
from time import sleep

driver = webdriver.Chrome("./chromedriver")
driver.get("http://demowebshop.tricentis.com/")
sleep(5)

# Print link text of all the links present in the left
# navigation bar of demowebshop
_xpath = "//div[@class='block block-category-navigation']//a"
links = driver.find_elements_by_xpath(_xpath)
for link in links:
    print(link.text)
    sleep(1)
```



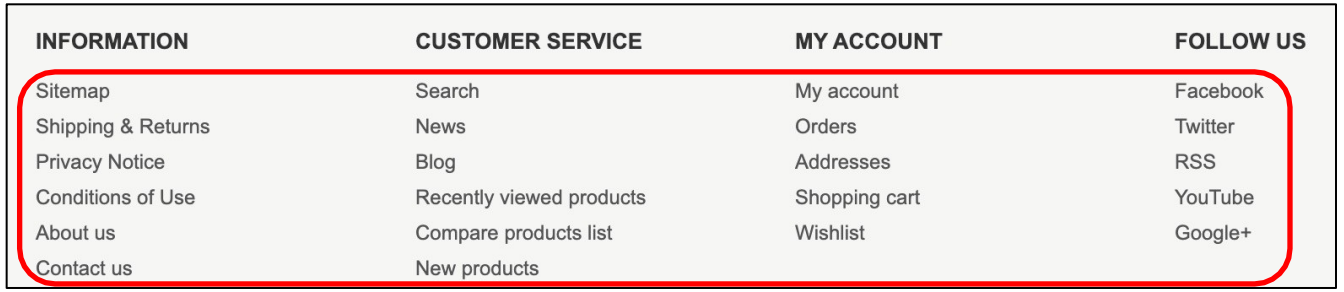
XPATH (Parent-Child relationship)

GET LINK TEXT OF ALL **FOOTER LINKS** IN DEMOWEBSHOP WEBPAGE

```
from selenium import webdriver
from time import sleep

driver = webdriver.Chrome("./chromedriver")
driver.get("http://demowebshop.tricentis.com/")
sleep(5)

# Print link text of all the link present in the footer
# of demowebshop.
_xpath = "//div[@class='footer-menu-wrapper']//a"
footer_links = driver.find_elements_by_xpath(_xpath)
for link in footer_links:
    print(link.text)
    sleep(1)
```

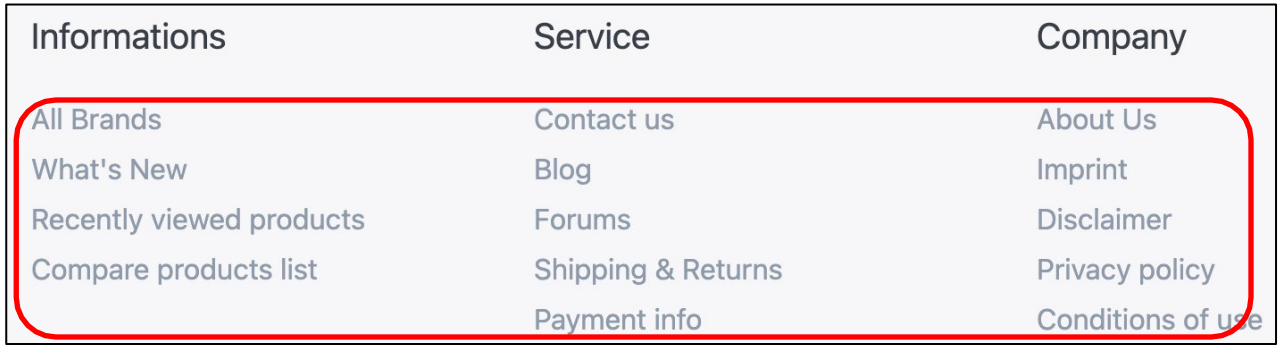


INFORMATION	CUSTOMER SERVICE	MY ACCOUNT	FOLLOW US
Sitemap	Search	My account	Facebook
Shipping & Returns	News	Orders	Twitter
Privacy Notice	Blog	Addresses	RSS
Conditions of Use	Recently viewed products	Shopping cart	YouTube
About us	Compare products list	Wishlist	Google+
Contact us	New products		

```
sandeep@Sandeeps-MacBook-Pro demo % python3 -i test_note.py
Sitemap
Shipping & Returns
Privacy Notice
Conditions of Use
About us
Contact us
Search
News
Blog
Recently viewed products
Compare products list
New products
My account
Orders
Addresses
Shopping cart
Wishlist
Facebook
Twitter
RSS
YouTube
Google+
>>>
```

XPATH (Parent-Child relationship)

GET LINK TEXT OF ALL **FOOTER LINKS** IN SMART BEAR WEBPAGE




```python
from selenium import webdriver
from time import sleep

driver = webdriver.Chrome("./chromedriver")
driver.get("https://services.smartbear.com/samples/TestComplete14/smartstore/")
sleep(5)

footer_links = driver.find_elements_by_xpath("//div[@class='container footer-main']//a")

for link in footer_links:
    print(link.text)
    sleep(0.5)
```

```
sandeep@Sandeeps-MacBook-Pro demo % python3 -i test_note.py
All Brands
What's New
Recently viewed products
Compare products list
Contact us
Blog
Forums
Shipping & Returns
Payment info
About Us
Imprint
Disclaimer
Privacy policy
Conditions of use
>>>
```

XPATH (Parent-Child relationship)

GET LINK TEXT OF ALL THE **JOB TITLES IN SEARCH RESULTS** OF MONSTER.COM

```
from selenium import webdriver
from time import sleep

driver = webdriver.Chrome("./chromedriver")
driver.get("https://www.monsterindia.com/")
driver.maximize_window()
sleep(5)

driver.find_element_by_xpath("//input[@id='SE_home_autocomplete']").send_keys("python")
sleep(3)
driver.find_element_by_xpath("//strong[text()='Python']").click()
sleep(2)
driver.find_element_by_xpath("//input[@value='Search']").click()
sleep(5)
# print the job titles of all the jobs in monster.com search results
job_titles = driver.find_elements_by_xpath("//div[@class='job-tittle']/h3/a")
for job_title in job_titles:
    print(job_title.text)
    sleep(0.5)
```

XPATH

GET THE **ACTUAL PRICE** TAG OF ALL THE NEW PRODUCTS IN SMART BEAR WEBPAGE

https://services.smartbear.com/samples/TestComplete14/smartstore/newproducts

```
def read_csv():
    expected_prices = { }
    with open('smart_prices.csv') as f:
        rows = csv.DictReader(f)
        for row in rows:
            expected_prices[row['product']] = float(row['price'])
    return expected_prices

def get_actual_price(price):
    temp = re.findall(r'[\d\.]', price)
    price = float(''.join(temp))
    return price

reference = read_csv()

for name, expected_price in reference.items():
    _xpath = f"//span[text()='{name}']/../../..//span[@class='art-price' or @class='art-price art-price--offer']"
    price_element = driver.find_element_by_xpath(_xpath)
    # Reading the actual price
    actual_price = price_element.text
    # Comparing actual with expected price
    if get_actual_price(actual_price) == expected_price:
        print('PASS')
    else:
        print(f'For {name} the actual price is {get_actual_price(actual_price)}, but the expected price is {expected_price}')
```

LOCATING MULTIPLE ELEMENTS

`find_elements`

- 👉 Returns list of web elements.
- 👉 Each item of the list is a web element.
- 👉 If there are no web elements which matches the given property and its value, **`find_elements`** method returns an empty list.

LOCATING MULTIPLE ELEMENTS

CHECK **ALL** THE CHECKBOX'S

```
from selenium import webdriver
from time import sleep

driver = webdriver.Chrome("chromedriver")
driver.get('file:///Users/sandeep/Desktop/demo-html/demo.html')
elements = driver.find_elements_by_name("download")

for element in elements:
    element.click()
```

CHECK ALL THE CHECKBOX'S IN **REVERSED** ORDER

```
from selenium import webdriver
from time import sleep

driver = webdriver.Chrome("chromedriver")
driver.get('file:///Users/sandeep/Desktop/demo-html/demo.html')
elements = driver.find_elements_by_name("download")

for element in elements[::-1]:
    element.click()
```

CHECK **ALTERNATE** CHECKBOX'S

```
from selenium import webdriver
from time import sleep

driver = webdriver.Chrome("chromedriver")
driver.get('file:///Users/sandeep/Desktop/demo-html/demo.html')
elements = driver.find_elements_by_name("download")

for element in elements[::2]:
    element.click()
```

CHECK **FIRST** AND **LAST** CHECKBOX

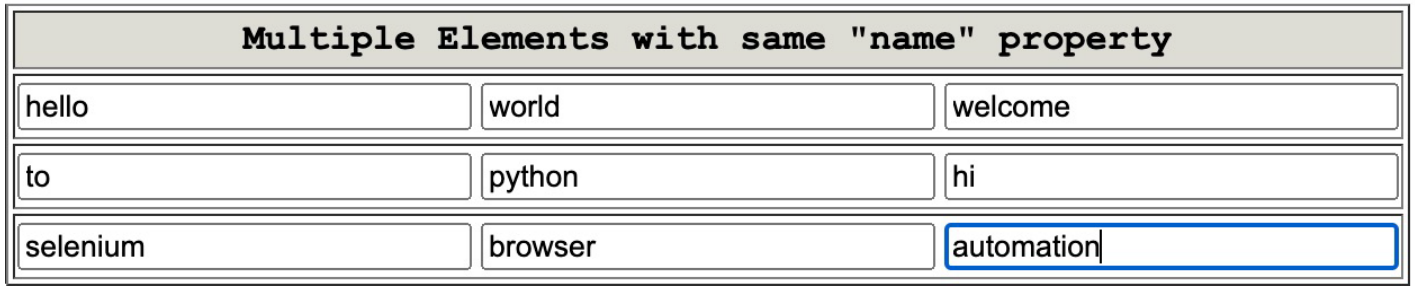
```
from selenium import webdriver
from time import sleep

driver = webdriver.Chrome("chromedriver")
driver.get('file:///Users/sandeep/Desktop/demo-html/demo.html')
elements = driver.find_elements_by_name("download")

elements[0].click()
elements[-1].click()
```

LOCATING MULTIPLE ELEMENTS

ENTERING TEXT IN **ALL THE TEXT BOXES** IN DEMO WEBPAGE




```
from selenium import webdriver
from time import sleep

driver = webdriver.Chrome("./chromedriver")
driver.get("file:///Users/sandeep/Desktop/demo-html/demo.html")
sleep(2)

# Finding all the text boxes using "find_elements_by_xpath" method
boxes = driver.find_elements_by_xpath("//input[@name='fname']")

# Text to be edited in each text field
contents = ["hello", "world", "welcome", "to", "python", "hi", "selenium", "browser", "automation"]

# Iterating between two different lists in parallel.
for box, content in zip(boxes, contents):
    box.send_keys(content)
    sleep(1)
```

LOCATING MULTIPLE ELEMENTS

PRINT **LINK TEXT** OF ALL THE LINKS

```
from selenium import webdriver
from time import sleep

driver = webdriver.Chrome("./chromedriver")
driver.get("https://www.python.org/")
driver.maximize_window()
sleep(5)

# Get all the web elements which matches the xpath "//a" (all links)
links = driver.find_elements_by_xpath("//a")
# Declare an empty list
all_links = [ ]
# Loop through the list (links), get the text of each link and append the text to the list
for link in links:
    all_links.append(link.text.strip())
```

ALTERNATE SOLUTION USING **LIST COMPREHENSION** 

```
from selenium import webdriver
from time import sleep

driver = webdriver.Chrome("./chromedriver")
driver.get("https://www.python.org/")
driver.maximize_window()
sleep(5)
# Get all the web elements which matches the xpath "//a" (all links)
links = driver.find_elements_by_xpath("//a")
# using list comprehension
all_links = [ link.text.strip() for link in links ]
```

LIST OF LINK TEXT OF ALL THE LINKS IFF THE TEXT CONTAINS '**PYTHON**' WORD IN IT.

```
from selenium import webdriver
from time import sleep

driver = webdriver.Chrome("./chromedriver")
driver.get("https://www.python.org/")
driver.maximize_window()
sleep(5)
# Get all the web elements which matches the xpath "//a" (all links)
links = driver.find_elements_by_xpath("//a")
# Declare an empty list
python_links = [ ]
# Loop through the list (links), get the text of each link.
for link in links:
    # Get the text of each link using property "text"
    link_of_link = link.text
    # Check if the link text has a sub string "Python"
    if "Python" in link_of_link.text:
        python_links.append(link.text.strip())
```

LOCATING MULTIPLE ELEMENTS

LIST OF TUPLES OF LINK TEXT OF ALL THE LINKS IFF THE TEXT CONTAINS '**PYTHON**' WORD IN IT AND CORRESPONDING VALUE OF "**HREF**" ATTRIBUTE.

```python
from selenium import webdriver
from time import sleep

driver = webdriver.Chrome("./chromedriver")
driver.get("https://www.python.org/")
driver.maximize_window()
sleep(5)
# Get all the web elements which matches the xpath "//a" (all links)
links = driver.find_elements_by_xpath("//a")
# Declare an empty list
urls = [ ]
# Get all the links present on the webpage.
links = driver.find_elements_by_xpath("//a")
# loop through the list (links)
for link in links:
    # Get the text of each link using property "text"
    link_text = link.text
    # Check if the link text has word "Python" in it using "in" operator.
    # If the link text has "Python" sub-string in it, get the value of "href" attribute
    if 'Python' in link_text:
        value_href = link.get_attribute("href")
        # append a tuple of link text and value of "href" attribute to the list
        urls.append((value_href, link_text))
for url in urls:
    # Prints a tuple of url and its link text pair.
    print(url)
```

TUPLE OF HREF AND LINK TEXT

LOCATING MULTIPLE ELEMENTS

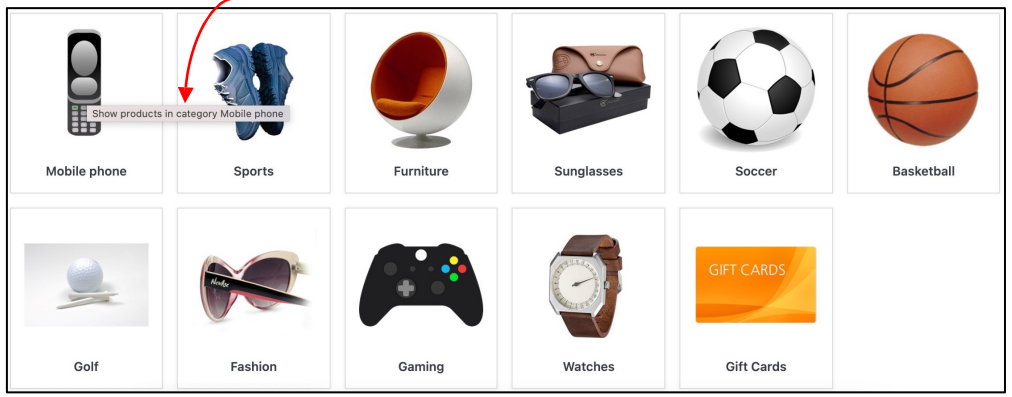
PRINT **ALT TAGS** OF ALL THE IMAGES PRESENT ON SMART BEAR WEBPAGE

```
from selenium import webdriver
from time import sleep

driver = webdriver.Chrome("./chromedriver")
driver.get("https://services.smartbear.com/samples/TestComplete14/smartstore/")
driver.maximize_window()
sleep(5)

images = driver.find_elements_by_xpath("//img")
for image in images:
    print(image.get_attribute("alt"))
    sleep(0.2)
```

ALT TAG



`get_attribute` method returns the value of the attribute that is passed to the method.

If the attribute does not exist, **`get_attribute`** `method returns` **`None`**

BROWSER AUTOMATION
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SELECT ELEMENT

SELECT ELEMENT

select

- All list box related methods are implemented inside the class “**Select**”.
- In order to access methods of ”**Select**” class, we need to create an object instance to the ”**Select**” class and pass a “**WebElement**” (list box) as constructor argument.
- There are 3 different methods available in “**Select**” class to select an item from the list box.
    1. select_item_by_visible_text
    2. select_item_by_index
    3. select_by_value

SELECT ELEMENT

select_by_visible_text

```
from selenium import webdriver
from time import sleep
from selenium.webdriver.support.select import Select

driver = webdriver.Chrome("./chromedriver")
driver.get("file:///Users/sandeep/Desktop/demo-html/demo.html")
sleep(2)

lst_box = driver.find_element_by_id("standard_cars")
select = Select(lst_box)
select.select_by_visible_text("Audi")
sleep(1)
select.select_by_visible_text("Mercedes")
```

select_by_visible_text Selects an <option> based upon its text

```
<select id="standard_cars"> == $0
  <option value="sel">Select car:</option>
  <option value="aud">Audi</option>
  <option value="bmw">BMW</option>
  <option value="for">Ford</option>
  <option value="hda">Honda</option>
```

VISIBLE TEXT

SELECT ELEMENT

select_by_index

```
from selenium import webdriver
from time import sleep
from selenium.webdriver.support.select import Select

driver = webdriver.Chrome("./chromedriver")
driver.get("file:///Users/sandeep/Desktop/demo-html/demo.html")
sleep(2)

lst_box = driver.find_element_by_id("standard_cars")
select = Select(lst_box)
select.select_by_index(4)
sleep(1)
select.select_by_index(8)
```

👉 **select_by_index** Selects an <option> based upon the **<select>** element's internal index

👉 Index starts from 1

SELECT ELEMENT

select_by_value

```
from selenium import webdriver
from time import sleep
from selenium.webdriver.support.select import Select

driver = webdriver.Chrome("./chromedriver")
driver.get("file:///Users/sandeep/Desktop/demo-html/demo.html")
sleep(2)

lst_box = driver.find_element_by_id("standard_cars")
select = Select(lst_box)
select.select_by_value("jgr")
sleep(1)
select.select_by_value("vol")
```

select_by_value selects an <option> based upon its value attribute

```
<option value="jgr">Jaguar</option>
<option value="lr">Land Rover</option>
<option value="merc">Mercedes</option>
<option value="min">Mini</option>
<option value="nin">Nissan</option>
<option value="toy">Toyota</option>
<option value="vol">Volvo</option> == $0
```

VALUE ATTRIBUTE

SELECT ELEMENT

options

- Returns the list of all the **options (each option is a WebElement)** present in the list box.
- Each item of the list is an `option` element (WebElement).
- To get the text of all the options, we need to iterate over the list that is returned by `options` method and call the attribute `"text"` on each item of the list.

```
driver = webdriver.Chrome("./chromedriver")
driver.get("file:///Users/sandeep/Desktop/demo-html/demo.html")
sleep(2)

lst_box = driver.find_element_by_id("standard_cars")
select = Select(lst_box)
all_options = select.options

for item in all_options:
    print(item.text)
    sleep(1)
```

SELECT ELEMENT

SELECTING EACH ITEM IN THE LIST BOX ONE BY ONE

```
from selenium import webdriver
from time import sleep
from selenium.webdriver.support.select import Select

driver = webdriver.Chrome("./chromedriver")
driver.get("file:///Users/sandeep/Desktop/demo-html/demo.html")
sleep(2)

lst_box = driver.find_element_by_id("standard_cars")
select = Select(lst_box)
all_options = select.options

for item in all_options:
    select.select_by_visible_text(item.text)
    sleep(1)
```

SELECT ELEMENT

SELECT **LAST ITEM** OF THE LIST BOX

```
from selenium.webdriver import Chrome
from time import sleep
from selenium.webdriver.support.select import Select

driver = Chrome("/Users/sandeep/Desktop/Training/_selenium/chromedriver")
driver.maximize_window()
driver.get("file:///Users/sandeep/Desktop/demo-html/demo.html")
sleep(4)

element = driver.find_element_by_id("standard_cars")
s = Select(element)

# Get all the options from the listbox
all_options = s.options

# Get the text of each option to select last item in the list box using visible text
items = [  item.text  for item in all_options]

s.select_by_visible_text(items[-1])
```

SELECT ELEMENT

SELECTING EACH ITEM IN THE LIST BOX ONE BY ONE IN **REVERSED ORDER**

```
from selenium import webdriver
from time import sleep
from selenium.webdriver.support.select import Select

driver = webdriver.Chrome("./chromedriver")
driver.get("file:///Users/sandeep/Desktop/demo-html/demo.html")
sleep(2)

lst_box = driver.find_element_by_id("standard_cars")
select = Select(lst_box)
all_options = select.options

for item in all_options[::-1]:
    select.select_by_visible_text(item.text)
    sleep(1)
```

```
from selenium import webdriver
from time import sleep
from selenium.webdriver.support.select import Select

driver = webdriver.Chrome("./chromedriver")
driver.get("file:///Users/sandeep/Desktop/demo-html/demo.html")
sleep(2)

lst_box = driver.find_element_by_id("standard_cars")
select = Select(lst_box)
all_options = select.options

for item in reversed(all_options):
    select.select_by_visible_text(item.text)
    sleep(1)
```

SELECT ELEMENT

PRINT INDEX AT WHICH THE "**MERCEDES**" IS PRESENT

```
from selenium import webdriver
from time import sleep
from selenium.webdriver.support.select import Select

driver = webdriver.Chrome('./chromedriver')
driver.get("file:///Users/sandeep/Desktop/demo-html/demo.html")
sleep(2)

lst_box = driver.find_element_by_id("standard_cars")
select = Select(lst_box)
all_options = select.options

# Get the text of each option and build a new list
items = [item.text for item in all_options]

# Check if "Mercedes" is present in the listbox
# If "Mercedes" is present, print the index of it.
for index, item in enumerate(items):
    if item == "Mercedes":
        print(f'{item} is present at index {index}')
```

SELECT ELEMENT

`first_selected_option`

- Returns the **option (WebElement)** which is currently selected in the list box.
- Since, `first_selected_option` returns a WebElement, we need to call the method `text`, to get the text of the option that is currently selected.

```
from selenium import webdriver
from time import sleep
from selenium.webdriver.support.select import Select

driver = webdriver.Chrome("./chromedriver")
driver.get("file:///Users/sandeep/Desktop/demo-html/demo.html")
sleep(2)

lst_box = driver.find_element_by_id("standard_cars")
select = Select(lst_box)
select.select_by_visible_text('Mercedes')
currently_selected_option = select.first_selected_option.text
```

`first_selected_option.text` return's the text of currently selected option, "Mercedes"

SELECT ELEMENT

selecting multiple items in multi-select

```
from selenium import webdriver
from time import sleep
from selenium.webdriver.support.select import Select

driver = webdriver.Chrome('./chromedriver')
driver.get("file:///Users/sandeep/Desktop/demo-html/demo.html")
sleep(2)

lst_box = driver.find_element_by_id("multiple_cars")
select = Select(lst_box)

select.select_by_visible_text("Audi")
sleep(1)
select.select_by_visible_text("Mercedes")
sleep(1)
select.select_by_visible_text("Toyota")
```

SELECT ELEMENT

deselect_by_visible_text

deselect_by_index

deselect_by_value

```
from selenium import webdriver
from time import sleep
from selenium.webdriver.support.select import Select

driver = webdriver.Chrome('./chromedriver')
driver.get("file:///Users/sandeep/Desktop/demo-html/demo.html")
sleep(2)

lst_box = driver.find_element_by_id("multiple_cars")
select = Select(lst_box)

# de-select by visible text
select.deselect_by_visible_text("Audi")
sleep(1)
# de-select by index
select.deselect_by_visible_index(8)
sleep(1)

# de-select by value
select.deselect_by_visible_text("merc")
sleep(1)
```

SELECT ELEMENT

`selecting all items in multi-select`

- Unlike "**`deselect_all`**" method, there is no direct method in **Select** class to select all the items of multi-select.

- To select all the items of multi-select, get the text of each option and select each item one by one using for loop

```
from selenium import webdriver
from time import sleep
from selenium.webdriver.support.select import Select

driver = webdriver.Chrome('./chromedriver')
driver.get("file:///Users/sandeep/Desktop/demo-html/demo.html")
sleep(2)

lst_box = driver.find_element_by_id("multiple_cars")
select = Select(lst_box)
all_options = select.options

# Get the text of each option and build a new list
items = [item.text for item in all_options]

for item in items:
    select.select_by_visible_text(item)
    sleep(1)
```

SELECT ELEMENT

`all_selected_option`

- Returns the **option (WebElement)** which is currently selected in the list box.

- Since, **`all_selected_options`** returns a list of Web Elements, we need to call the method **`text`**, to get the text of the option that is currently selected.

```
from selenium import webdriver
from time import sleep
from selenium.webdriver.support.select import Select

driver = webdriver.Chrome("./chromedriver")
driver.get("file:///Users/sandeep/Desktop/demo-html/demo.html")
sleep(2)

lst_box = driver.find_element_by_id("multiple_cars")
select = Select(lst_box)
select.select_by_visible_text('Mercedes')
select.select_by_visible_text('Audi')
select.select_by_visible_text('Toyota')

# Returns list of all the options that are currently
# selected in multi-select listbox
all_selected_options = select.all_selected_options

# Prints text of each option
for item in all_selected_options:
    print(item.text)
```

SELECT ELEMENT

is_multiple

- 👉 Returns "**True**" if the select element is multiple select.
- 👉 Returns "**False**" if the select element is single select.

```
from selenium import webdriver
from time import sleep
from selenium.webdriver.support.select import Select

driver = webdriver.Chrome("./chromedriver")
driver.get("file:///Users/sandeep/Desktop/demo-html/demo.html")
sleep(2)

lst_box = driver.find_element_by_id("multiple_cars")
select = Select(lst_box)
# Prints True
print(select.is_multiple)
```

BROWSER AUTOMATION
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SYNCHRONIZATION

SYNCHRONIZATION

synchronization

- One of the main challenges for successful browser automation is to match the pace of your script execution with the pace of the application.

- In browser automation, before performing any operation on any web element, the script has to wait for the element to be visible(or/and enabled) on the webpage.

- Selenium provides two different way's to Achieve Synchronization.
    1. Explicit Wait
    2. Implicit Wait

SYNCHRONIZATION – WebDriverWait (Explicit Wait)

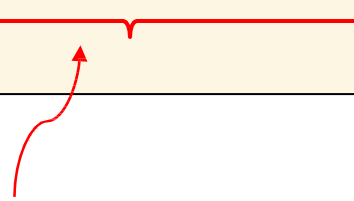
`visibility_of_element_located`

- `visibility_of_element_located` checks if the web element is present on the DOM and also visible on the webpage. (Both conditions will be checked)
- "`TimeoutException`" will be raised if either the element is not loaded onto the DOM or the element is not visible on the web page within timeout period.
- If the element is found in the DOM and also visible on webpage, but disabled, No exception will be raised by `until` method.

SYNCHRONIZATION – WebDriverWait (Explicit Wait)

WAIT FOR VISIBILITY OF “div” with “python” TEXT IN DEMO HTML PAGE

```
from selenium.webdriver.support.wait import WebDriverWait
from selenium.webdriver.support.expected_conditions import visibility_of_element_located

driver = Chrome()
driver.maximize_window()
driver.get("file:///Users/sandeep/Desktop/training/_selenium/demo-html/ajaxy_page.html")
wait = WebDriverWait(driver, 10)
driver.find_element("name", "typer").send_keys("python")
sleep(1)
driver.find_element("id", "green").click()
sleep(1)
driver.find_element("name", "submit").click()
# wait until the element is loaded in the DOM and visible on the webpage
wait.until(visibility_of_element_located(("xpath", "//div[text()='python']")))
# print DONE
print("DONE!!!!")
```



TUPLE OF LOCATOR TYPE AND LOCATOR VALUE

SYNCHRONIZATION – WebDriverWait (Explicit Wait)

`until`

- `until` method takes a callable as an argument.
- `Until` method calls the callable repeatedly with time interval of 0.5 seconds (POLL_FREQUENCY) between the function calls.
- If the callable returns Boolean `True` (or the something which evaluates to Boolean True) within timeout period, the script execution will continue as normal without any exceptions.
- If the callable does not return Boolean `True` (or the something which evaluates to Boolean True) within timeout period, until method raises **TimeoutException**

SYNCHRONIZATION – WebDriverWait (Explicit Wait)

`invisibility_of_element_located`

- `invisibility_of_element_located` takes by locator as an argument. It throws `TimeoutException` if the element is visible even after the timeout period that is specified.
- If the web element does not exist on the DOM, `NoSuchElementException` or `StaleElementReferenceException` is NOT RAISED.

`element_to_be_clickable`

- element_to_be_clickable takes by locator as an argument. It throws `ElementNotClickableException` if the element to be clicked is either not visible or not enabled or missing from the DOM.

- For more information about explicit wait and conditions, please refer below link

https://www.selenium.dev/documentation/webdriver/waits/

SYNCHRONIZATION – Implicit Wait

`implicitly_wait`

- WebDriver polls the DOM for a certain duration when trying to any element.
- An implicit wait is to tell WebDriver to poll the DOM for a certain amount of time when trying to find an element or elements if they are not immediately available.
- Implicit wait will not wait for any condition to be achieved on the webelement. It just waits for the webelement to load in the HTML or DOM. If the element is not loaded in the DOM within timeout period, "`NoSuchElementException`" exception is raised.
- The **default setting is 0,** meaning disabled. Once set, the implicit wait is set for the **life of the driver or browser session**.

BROWSER AUTOMATION
USING
PYTHON-SELENIUM

SANDEEP SURYAPRASAD

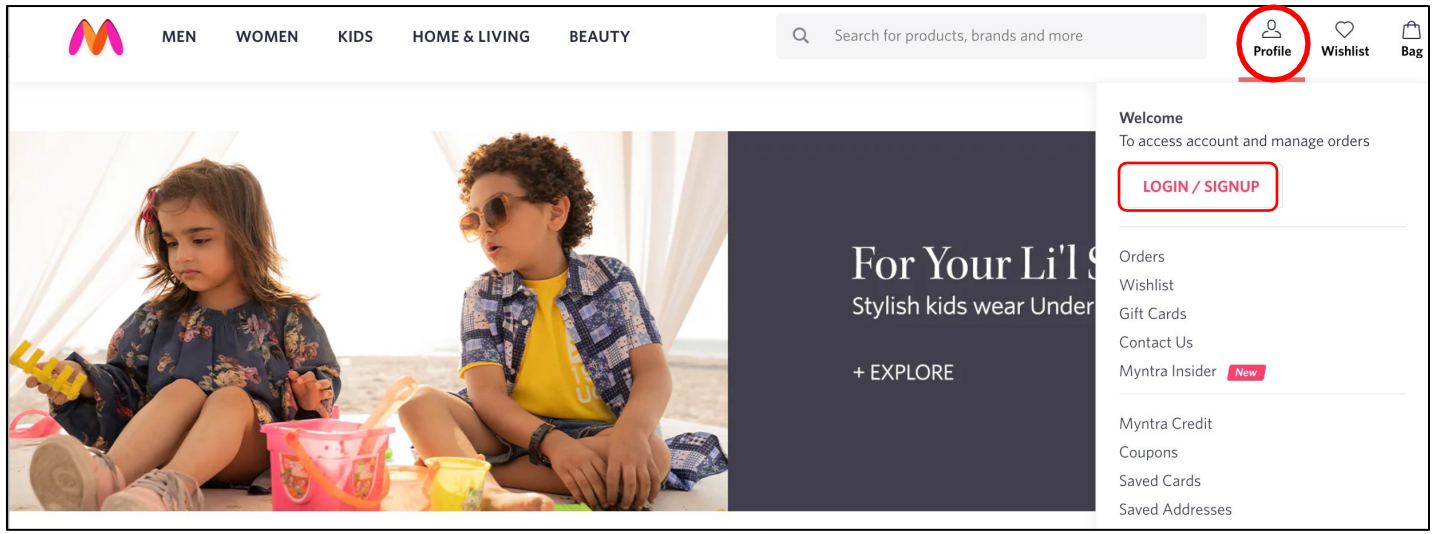
MOUSE ACTIONS

MOUSE ACTIONS

move_to_element

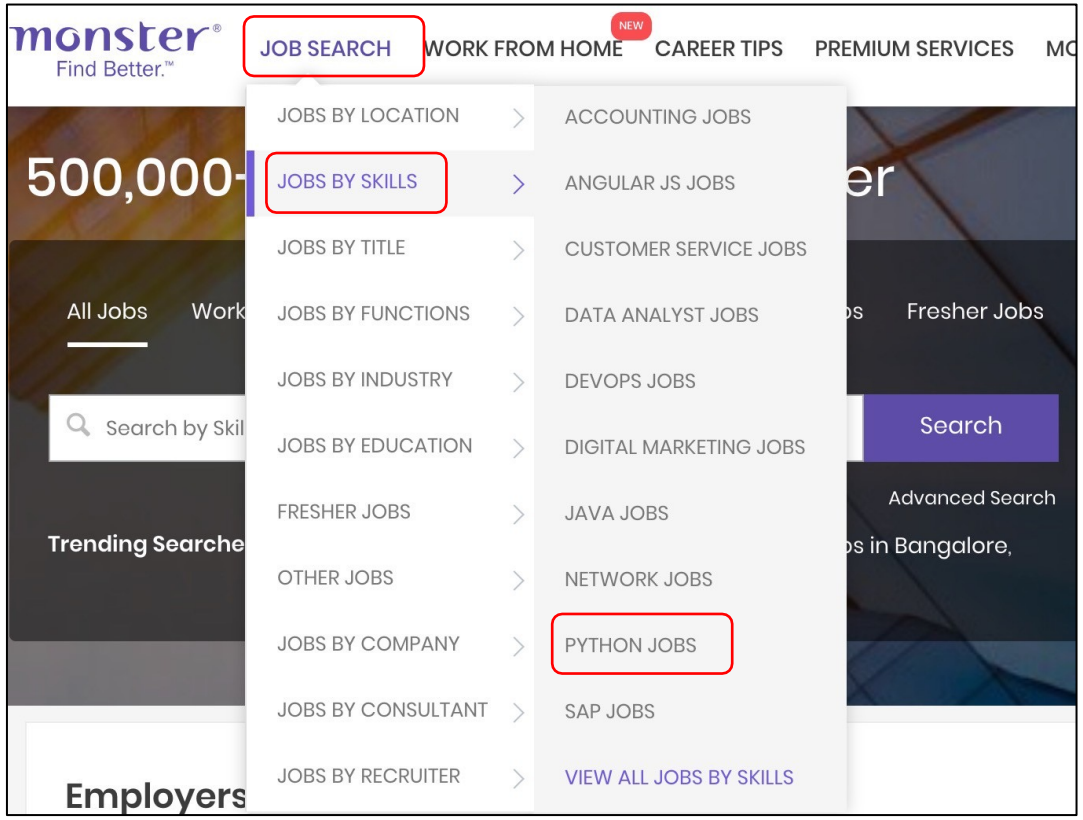
```
from selenium import webdriver
from time import sleep
from selenium.webdriver.common.action_chains import ActionChains

driver = webdriver.Chrome("./chromedriver")
driver.get("https://www.myntra.com/")
sleep(5)

actions = ActionChains(driver)

profile = driver.find_element_by_xpath("//span[text()='Profile']")
# Mouse Hover on "Profile"
actions.move_to_element(profile).perform()
sleep(1)

driver.find_element_by_xpath("//a[text()='login / Signup']").click()
```

PASSING WEB ELEMENT AS ARGUMENT



MOUSE ACTIONS

move_to_element




```python
from selenium import webdriver
from time import sleep
from selenium.webdriver.common.action_chains import ActionChains

driver = webdriver.Chrome("./chromedriver")
driver.get("https://www.monsterindia.com/")
sleep(5)

actions = ActionChains(driver)

jobs_search = driver.find_element_by_xpath("//a[text()='Job search']")

actions.move_to_element(jobs_search).perform()
sleep(2)

jobs_by_skills = driver.find_element_by_xpath("//a[text()='Jobs by Skills']")

actions.move_to_element(jobs_by_skills).perform()
sleep(2)

python_jobs = driver.find_element_by_xpath("//a[contains(text(), 'Python Jobs')]")
actions.move_to_element(python_jobs).perform()
sleep(2)

python_jobs.click()
```

MOUSE ACTIONS

`double_click`

- 👉 Find the WebElement on which double click operation to be performed
- 👉 Pass the WebElement to **`double_click`** function as argument.

```
from selenium import webdriver
from time import sleep
from selenium.webdriver.common.action_chains import ActionChains

driver = webdriver.Chrome("./chromedriver")
driver.get("file:///Users/sandeep/Desktop/demo-html/demo.html")
sleep(2)

actions = ActionChains(driver)

click_me = driver.find_element_by_xpath("//button[text()='Double-click me']")

actions.double_click(click_me).perform()
```

MOUSE ACTIONS

send_keys

```
from selenium import webdriver
from time import sleep
from selenium.webdriver.common.action_chains import ActionChains
from selenium.webdriver.common.keys import Keys

driver = webdriver.Chrome("./chromedriver")
driver.get("http://demowebshop.tricentis.com/")
sleep(5)

actions = ActionChains(driver)
actions.send_keys(Keys.PAGE_DOWN).perform()
```

```
from selenium import webdriver
from time import sleep
from selenium.webdriver.common.action_chains import ActionChains
from selenium.webdriver.common.keys import Keys

driver = webdriver.Chrome("./chromedriver")
driver.get("http://demowebshop.tricentis.com/")
sleep(5)

actions = ActionChains(driver)
actions.send_keys(Keys.ARROW_DOWN).perform()
```

```
from selenium import webdriver
from time import sleep
from selenium.webdriver.common.action_chains import ActionChains
from selenium.webdriver.common.keys import Keys

driver = webdriver.Chrome("./chromedriver")
driver.get("http://demowebshop.tricentis.com/")
sleep(5)

actions = ActionChains(driver)
actions.send_keys(Keys.PAGE_UP).perform()
```

```
from selenium import webdriver
from time import sleep
from selenium.webdriver.common.action_chains import ActionChains
from selenium.webdriver.common.keys import Keys

driver = webdriver.Chrome("./chromedriver")
driver.get("http://demowebshop.tricentis.com/")
sleep(5)

actions = ActionChains(driver)
actions.send_keys(Keys.ARROW_UP).perform()
```

MOUSE ACTIONS

send_keys

```
from selenium import webdriver
from time import sleep
from selenium.webdriver.common.action_chains import ActionChains
from selenium.webdriver.common.keys import Keys

driver = webdriver.Chrome("./chromedriver")
driver.get("http://demowebshop.tricentis.com/")
sleep(5)

actions = ActionChains(driver)
actions.send_keys(Keys.TAB).perform()
```

```
from selenium import webdriver
from time import sleep
from selenium.webdriver.common.action_chains import ActionChains
from selenium.webdriver.common.keys import Keys

driver = webdriver.Chrome("./chromedriver")
driver.get("http://demowebshop.tricentis.com/")
sleep(5)

actions = ActionChains(driver)
actions.send_keys(Keys.ENTER).perform()
```

```
from selenium import webdriver
from time import sleep
from selenium.webdriver.common.action_chains import ActionChains
from selenium.webdriver.common.keys import Keys

driver = webdriver.Chrome("./chromedriver")
driver.get("http://demowebshop.tricentis.com/")
sleep(5)

actions = ActionChains(driver)
actions.send_keys(Keys.ESCAPE).perform()
```

MOUSE ACTIONS

context_click

```
from selenium import webdriver
from time import sleep
from selenium.webdriver.common.action_chains import ActionChains
from selenium.webdriver.common.keys import Keys

driver = webdriver.Chrome("./chromedriver")
driver.get("http://demowebshop.tricentis.com/")
sleep(5)

# Store 'register' link web element
register_link = driver.find_element_by_xpath("//a[text()='Register']")

# Perform context-click action on the element
actions = ActionChains(driver)
actions.context_click(register_link).perform()
```

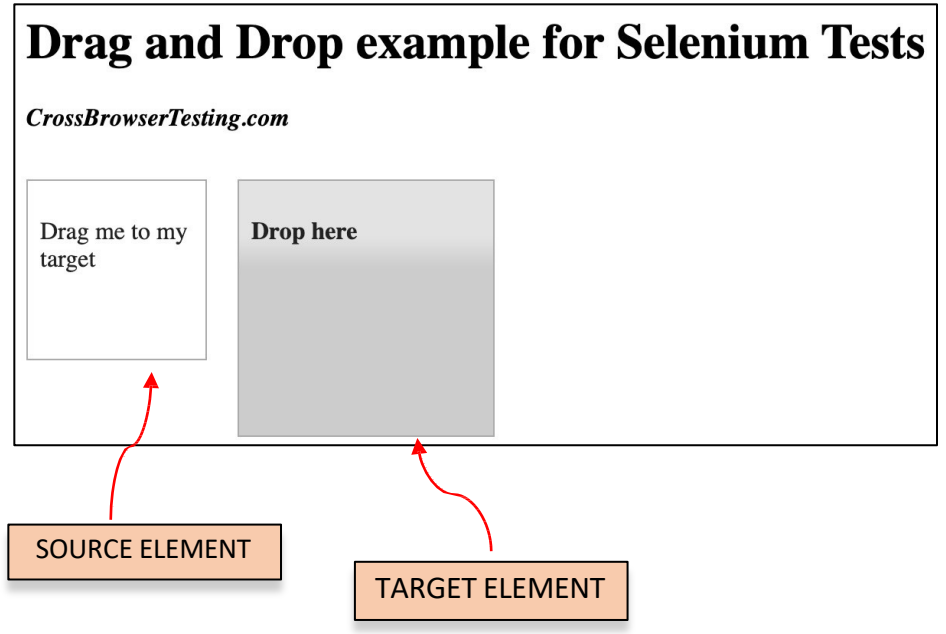
CONTEXT MENU

MOUSE ACTIONS

drag_and_drop

```
from selenium import webdriver
from time import sleep
from selenium.webdriver.common.action_chains import ActionChains

driver = webdriver.Chrome("./chromedriver")
driver.maximize_window()
driver.get("https://crossbrowsertesting.github.io/drag-and-drop.html")
sleep(5)

# store 'box A' as source element
source_element = driver.find_element_by_id("draggable")

# store 'box B' as target element
target_element = driver.find_element_by_id("droppable")

# performs drag and drop action of source element onto target element
actions = ActionChains(driver)
actions.drag_and_drop(source_element, target_element).perform()
```

https://crossbrowsertesting.github.io/drag-and-drop.html



BROWSER AUTOMATION
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MULTIPLE WINDOWS

HANDLING MULTIPLE WINDOWS

`window_handles`

- If your site opens a new tab or window, Selenium will let you work with it using a window handle.
- Each window has a unique identifier which remains persistent in a single session. (alpha Numeric ID)
- You can get the window handles of all the windows using `window_handles`.
- window handle at **0th index** of the list will always be the window handle of **parent window**.
- When a new window/tab opens, the driver control will be present on parent window. To work with new window, you will need to switch to it.
- When you are finished with a window or tab opened in your browser, you should close it and switch back to the window you were using previously (parent window).
- Forgetting to switch back to another window handle after closing a window will leave WebDriver executing on the now closed page, and will trigger a `NoSuchWindow` Exception. You must switch back to a valid window handle in order to continue execution.

HANDLING MULTIPLE WINDOWS

- launch demowebshop.
- click “Twitter” link at the footer of the webpage.
- ”twitter” webpage opens in a new tab.
- get window handles and switch to twitter tab and enter some text in search field
- switch back to parent window and click on “Register” link

```
from selenium import webdriver
from time import sleep

driver = webdriver.Chrome("./chromedriver")
driver.get("http://demowebshop.tricentis.com/")
# Click on "Twitter" link present on the footer of the webpage
driver.find_element_by_xpath("//a[text()='Twitter']").click()

# "Twitter" page opens in a new tab in the browser
# In-Order to switch the tab, get window handles
# window_handles retunrs a list of window ID's
handles = driver.window_handles

# switch to window handle of "Twitter"
driver.switch_to.window(handles[1])
sleep(2)

# Enter text in search text box on "Twitter" page
driver.find_element_by_xpath("//input[@placeholder='Search Twitter']").send_keys("hello")

# Switch back to Parent window
driver.switch_to.window(handles[0])
sleep(2)

# Click on "Register" link present on Demowebshop page
driver.find_element_by_xpath("//a[text()='Register']").click()
```

HANDLING MULTIPLE WINDOWS

- 👉 launch monster.com.
- 👉 search “python” jobs.
- 👉 click on first job title in search results
- 👉 click “APPLY” button

```
from selenium import webdriver
from time import sleep

driver = webdriver.Chrome("./chromedriver")
# Launch "monster.com"
driver.get("https://www.monsterindia.com/")
sleep(3)

driver.find_element_by_id("SE_home_autocomplete").send_keys("python")
sleep(2)
driver.find_element_by_xpath("(//strong[text()='Python'])[1]").click()
sleep(1)
driver.find_element_by_xpath("//input[@value='Search']").click()
sleep(5)
driver.find_element_by_xpath("(//div[@class='job-tittle']/h3/a)[1]").click()
sleep(4)
# Get the window handles
handles = driver.window_handles

# Switch to Child Browser
driver.switch_to.window(handles[1])

# Click in APPLY Button
driver.find_element_by_xpath("(//button[text()='APPLY'])[1]").click()
```

HANDLING MULTIPLE WINDOWS

- 👉 launch Demowebshop.
- 👉 Navigate to Books page
- 👉 Click on one of the book title
- 👉 Click on “Facebook” icon
- 👉 Enter email and close the “Facebook” popup window

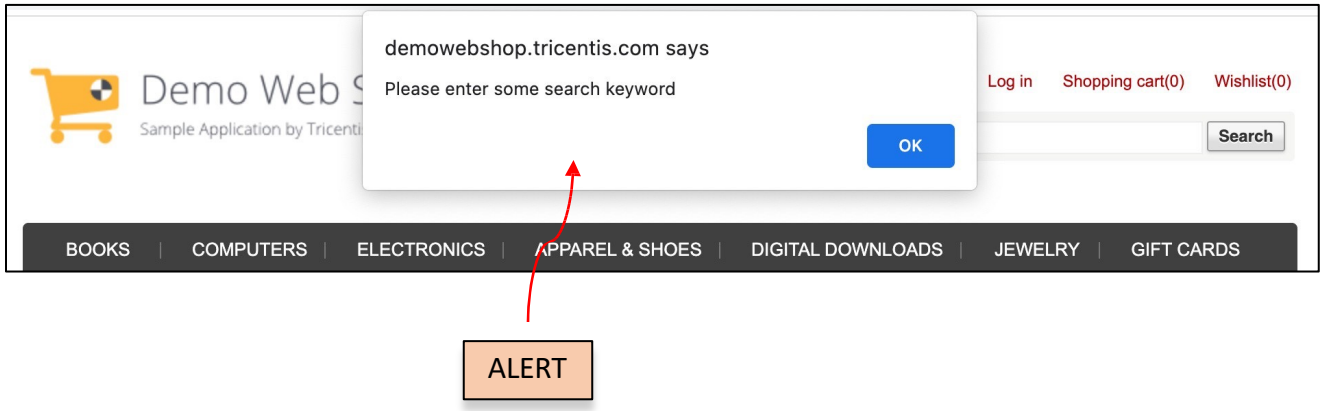
```
from selenium import webdriver
from time import sleep

driver = webdriver.Chrome("./chromedriver")
driver.maximize_window()
driver.get("http://demowebshop.tricentis.com/computing-and-internet")
sleep(5)
# Click on Facebook icon
driver.find_element_by_xpath("//a[@title='Facebook']").click()
sleep(4)
# Get all window handles
handles = driver.window_handles
# Switch to Facebook window
driver.switch_to.window(handles[1])
sleep(2)
# Enter Email and close the window
driver.find_element_by_name("email").send_keys("hello.world@company.com")
driver.close()
# Switch back to Parent window and close
driver.switch_to.window(handles[0])
sleep(2)
driver.close()
```

HANDLING MULTIPLE WINDOWS

JavaScript Alert

- An Alert shows a custom message, and a single button which dismisses the alert, labelled in most browsers as OK.
- WebDriver can get the text from the popup and accept or dismiss these alerts.

```
from selenium import webdriver
from time import sleep

driver = webdriver.Chrome("./chromedriver")
driver.get("http://demowebshop.tricentis.com/")
sleep(3)
# Click on Search Button without entering any Search Keyword
driver.find_element_by_xpath("//input[@value='Search']").click()
sleep(1)
# Get the text of the JavaScript Alert
print(driver.switch_to.alert.text)
# Click's on OK
driver.switch_to.alert.accept()
```

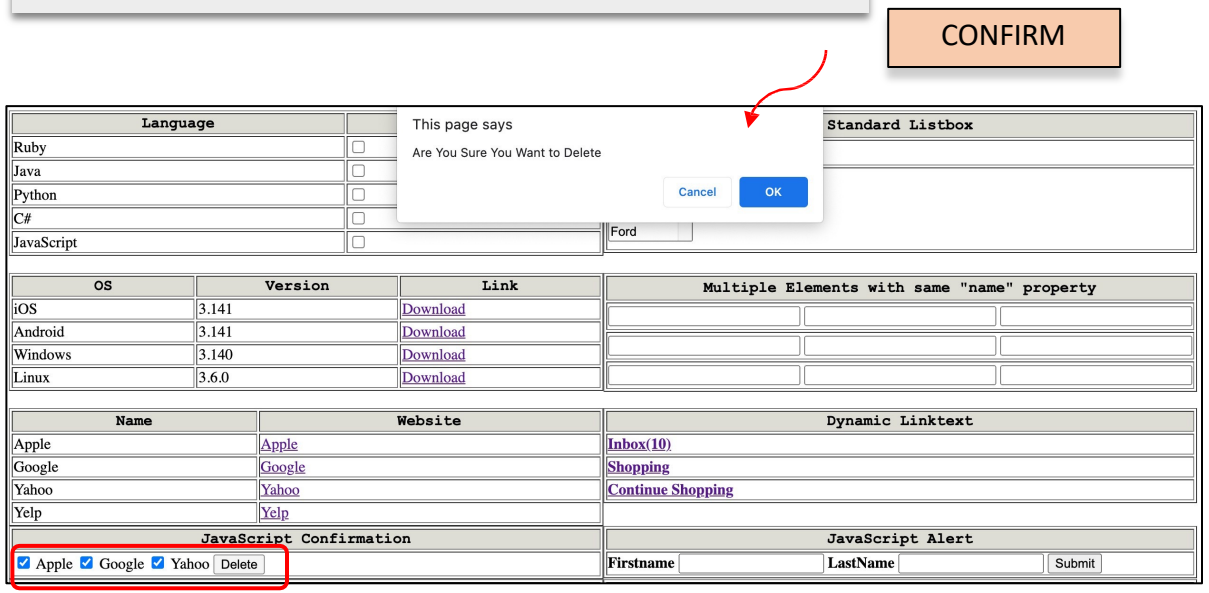


HANDLING MULTIPLE WINDOWS

JavaScript Confirm

👉 A confirm box is similar to an alert, except the user can also choose to cancel the message.

CONFIRM



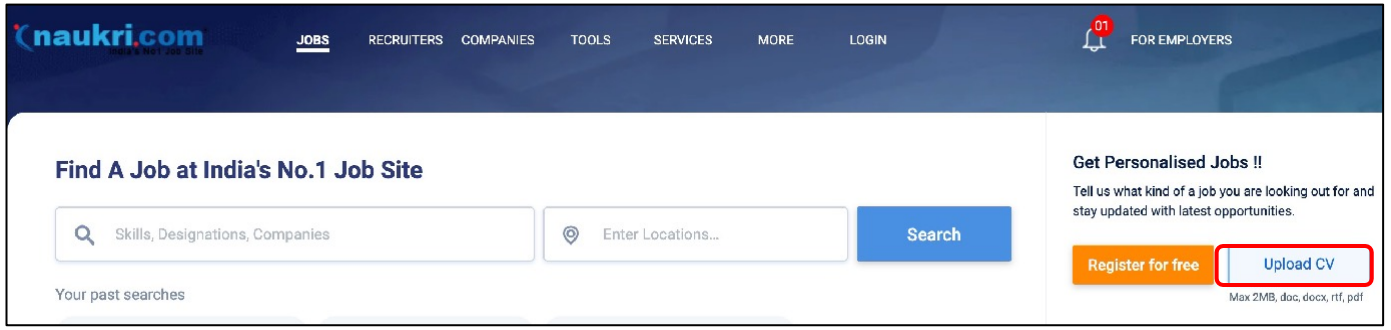

```python
from selenium import webdriver
from time import sleep

driver = webdriver.Chrome("./chromedriver")
driver.get("file:///Users/sandeep/Desktop/demo-html/demo.html")
sleep(3)
# Get all the checkboxes
elements = driver.find_elements_by_xpath("//input[@class='alert']")
# Check all the checkboxes
for item in elements:
    item.click()
    sleep(1)
# Click on "delete" button
driver.find_element_by_id("delete").click()
sleep(1)
# Switch to the alert and Accept the alert
driver.switch_to.alert.accept()
sleep(1)
# Click on "delete" button
driver.find_element_by_id("delete").click()
sleep(1)
# Switch to the alert and Accept the alert
driver.switch_to.alert.dismiss()
```

HANDLING MULTIPLE WINDOWS

file upload

- As soon the "Upload CV" button is clicked, file explorer window/popup will be opened, asking us to browse the CV to upload.
- we can handle the file browse/explorer popup using third party library like **PyAutoIT**.
- Instead of using the third party library to handle this popup, we can directly use "**send_keys**" method on the control which has "**file**" as value of the attribute "**type**"

```
from selenium import webdriver
from time import sleep

driver = webdriver.Chrome("./chromedriver")
driver.get("https://www.naukri.com/")
sleep(5)

driver.find_element_by_xpath("//input[@type='file']").send_keys("/Users/sandeep/Desktop/Test.docx")
```




```
▼<div class="wdgt-upload-btn">
   <label id="wdgt-file-upload" for="file_upload" title="Upload your CV to Re
   gister" class="btn" data-ga-click="ParserFlow|UploadCVClick" data-uba-
   click="UploadCVClick"> Upload CV </label>
   <input type="file" id="file_upload"> == $0
 </div>
```

FILE UPLOAD CONTROL

HANDLING MULTIPLE WINDOWS

file download

👉 File download popup can be handled either by using 3rd party library called PyAutoIT or programmatically (through **ChromeOptions** and **FireFoxProfile** class).

```
from selenium import webdriver
from time import sleep

opts = webdriver.ChromeOptions()
opts.add_experimental_option("prefs",{"download.default_directory": r"/users/sandeep/documents",
                                      "safebrowsing.enabled": True})
driver = webdriver.Chrome('./chromedriver', options=opts)
driver.get("https://www.whatsapp.com/download/")
sleep(5)
driver.find_element_by_xpath("//a[text()='Download for Mac OS X']").click()
```

```
from selenium import webdriver
from time import sleep

profile = webdriver.FirefoxProfile()
profile.set_preference("browser.download.folderList", 2)
profile.set_preference("browser.download.dir", r'/users/sandeep/documents')
profile.set_preference("browser.helperApps.neverAsk.saveToDisk", "application/octet-stream")
driver = webdriver.Firefox(profile)
driver.get("https://www.whatsapp.com/download/")
sleep(5)
driver.find_element_by_xpath("//a[text()='Download for Mac OS X']").click()
```

HANDLING MULTIPLE WINDOWS

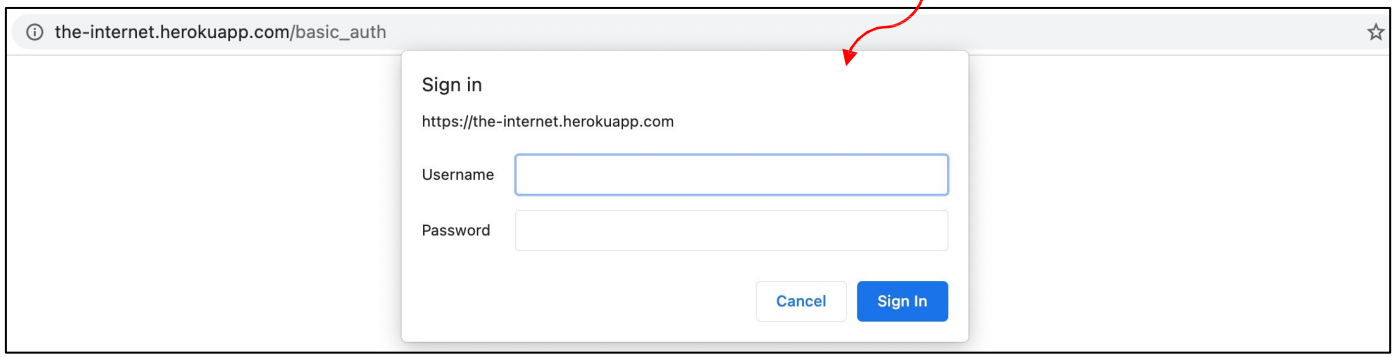
Authentication

- 👉 when we launch the url which asks for authentication, authentication popup will be displayed, asking user to authenticate.

- 👉 We can programmatically avoid this popup by directly passing the username and password in the url itself as shown in the code.

```
from selenium import webdriver

driver = webdriver.Chrome("./chromedriver")
driver.get("https://the-internet.herokuapp.com/basic_auth")
```

AUTHENTICATION POPUP



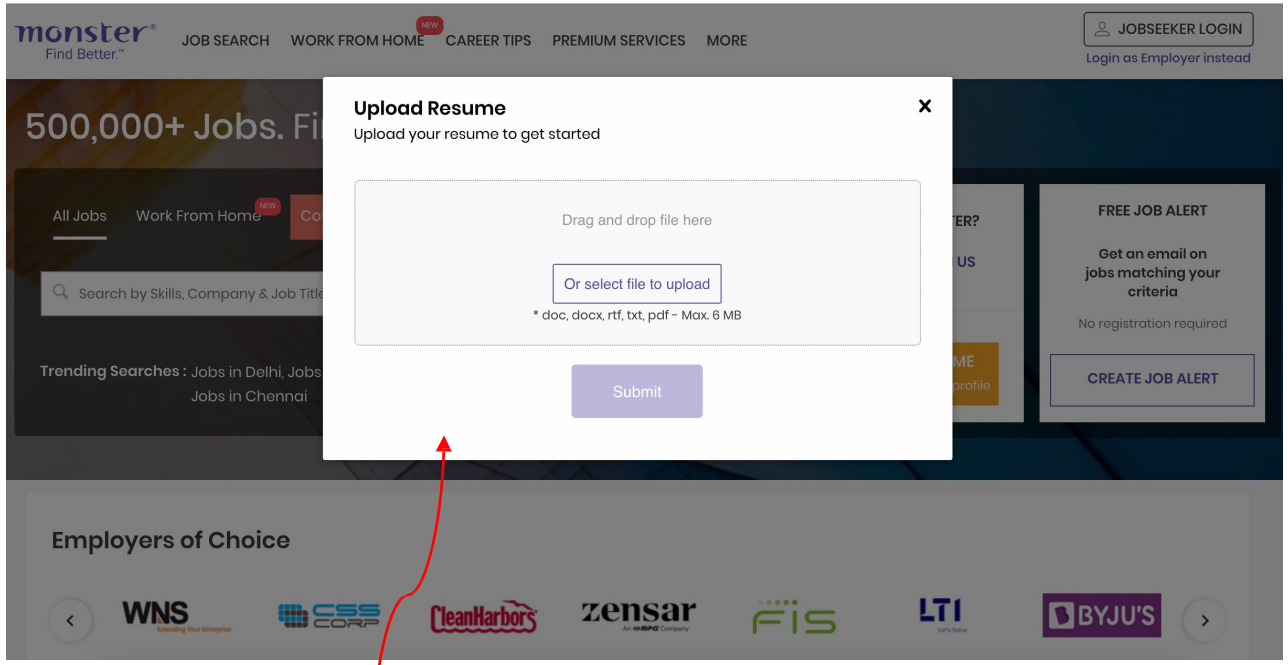

```
from selenium import webdriver

driver = webdriver.Chrome("./chromedriver")
driver.get("https://admin:admin@the-internet.herokuapp.com/basic_auth")
```

USERNAME

PASSWORD

HANDLING MULTIPLE WINDOWS

Model window or hidden division popup

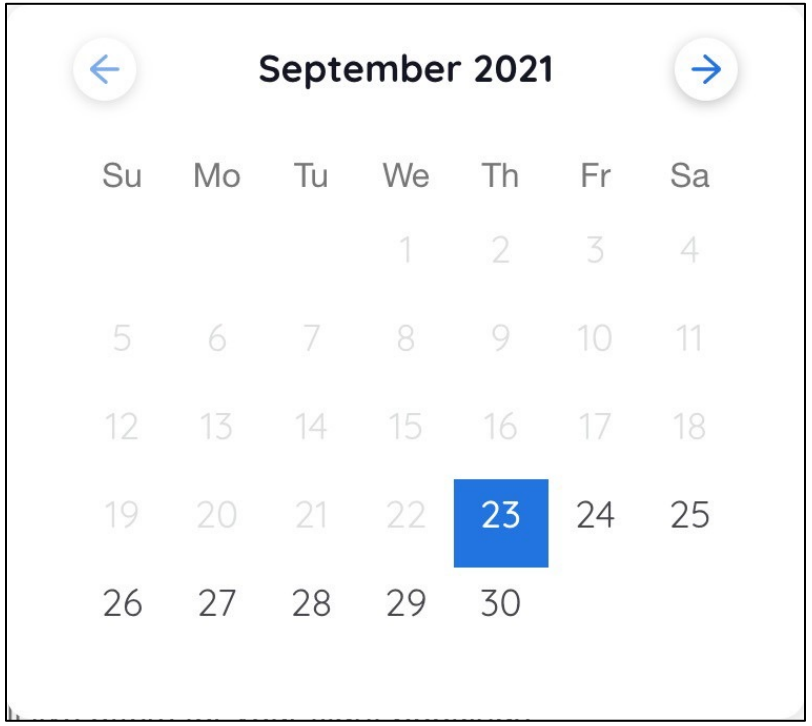


Hidden division popup. This will be displayed only when upload resume is clicked

- 👉 Hidden division pop is a dialog or overlay which is initially hidden, but will be popped up only the user performs some actions like click or on- page load etc.
- 👉 **This is not JavaScript popup**
- 👉 We can inspect the overlay
- 👉 When hidden division pop is opened, pop takes the focus from the application.
- 👉 When pop up is closed, focus automatically goes to the application.

HANDLING MULTIPLE WINDOWS

calendar popup



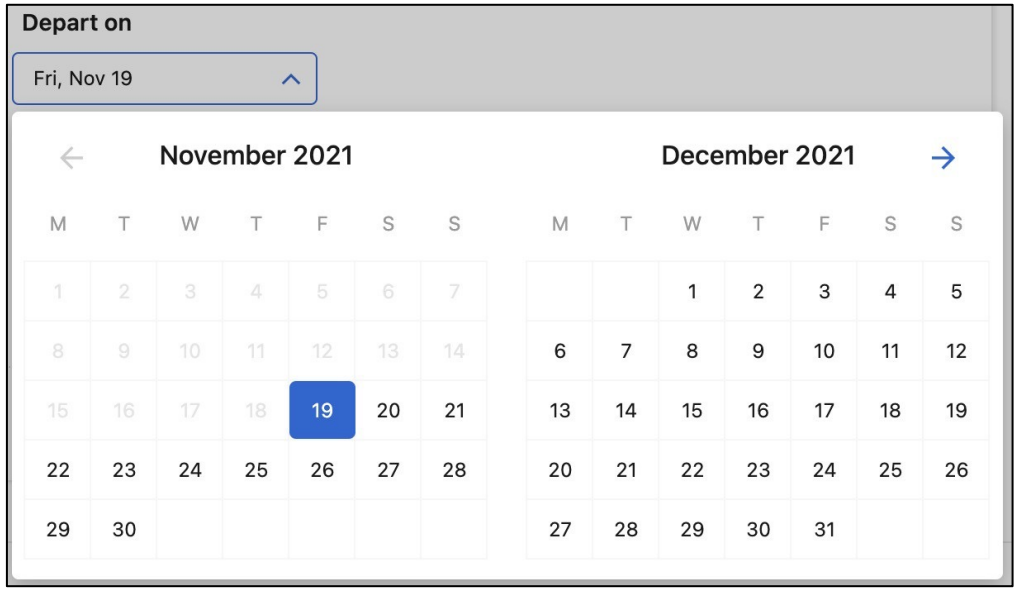
https://www.goibibo.com/

```
driver = webdriver.Chrome("./chromedriver")
driver.get("https://www.goibibo.com/")
driver.maximize_window()
sleep(5)

driver.find_element_by_id("departureCalendar").click()
sleep(2)
_month = 'March 2022'
_day = 28
# Selecting the Month (Assuming that we can book a ticket only 12 months in advance)
for _ in range(12):
    try:
        driver.find_element_by_xpath(f"//div[text()='{_month}']")
        break
    except NoSuchElementException:
        driver.find_element_by_xpath("//span[@aria-label='Next Month']").click()
        sleep(1)
        continue
# Select Day
try:
    driver.find_element_by_xpath(f"//div[text()={_day}]").click()
except NoSuchElementException:
    print('Invalid Date for the given month')
```

HANDLING MULTIPLE WINDOWS

calendar popup

https://www.cleartrip.com/




```python
from selenium import webdriver
from time import sleep
from selenium.common.exceptions import NoSuchElementException

driver = webdriver.Chrome("./chromedriver")
driver.maximize_window()
driver.get("https://www.cleartrip.com/")
sleep(5)

driver.find_element_by_xpath("//div[@class='flex flex-middle p-relative homeCalender']").click()
sleep(2)

_month = "November 2022"
_day = "26"
for _ in range(12):
    try:
        driver.find_element_by_xpath(f"//div[text()='{_month}']/../..//div[text()='{_day}']").click()
    except NoSuchElementException:
        driver.find_element_by_css_selector("svg[data-testid='rightArrow']").click()
        sleep(1)
        continue
```

BROWSER AUTOMATION USING PYTHON-SELENIUM

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iFRAMES

iframes

- An iFrame (Inline Frame) is an HTML document embedded inside the current HTML document or a website
- iFrame is defined by an **<iFrame></iFrame>** tag in HTML. With this tag you can identify an iFrame while inspecting the HTML tree
- Webdriver can't perform an action on web element automatically when object or web element are inside the frame
- In order to work with frame web elements we should pass driver control to the frame before performing an action

iFRAMES

HTML Code

```
<div id="modal">
  <iframe id="buttonframe" name="myframe"  src="https://seleniumhq.github.io">
    <button>Click here</button>
 </iframe>
</div>
```

switching frame using name/id

```
# Switch to frame by ID
driver.switch_to.frame('buttonframe')

# Now, click on the button
driver.find_element_by_xpath("//button[text()='Click here']")
```

switching frame by index

```
# switching to second iframe based on index
iframe = driver.find_elements_by_tag_name('iframe')[1]

# switch to selected iframe
driver.switch_to.frame(iframe)
```

switching frame using webelement

```
# Store the iframe webElement
iframe = driver.find_element_by_xpath("//iframe[@id='buttonframe']")

# Switch to iframe
driver.switch_to.frame(iframe)

# Now, click on the button
driver.find_element_by_xpath("//button[text()='Click here']")
```

coming out of frame

```
# switch back to default content
driver.switch_to.default_content()
```

BROWSER AUTOMATION
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COMMON EXCEPTIONS

COMMON EXCEPTIONS IN SELENIUM

NoSuchElementException

- This exception is raised when the element is not found in DOM
- The exception is raised by find_element method
- You may need to check the selector that you are using in find_element method to rectify the issue

StaleElementReferenceException

- Thrown when a reference to an element is now "stale" or Lost
- The possible cause for this exception is that you are no longer on the same page, or the page may have refreshed since the element was located
- The element may have been removed and re-added to the web page, since it was located
- Element may have been inside an iframe or another context which was refreshed

COMMON EXCEPTIONS IN SELENIUM

NoSuchAttributeException

- Thrown when the attribute of element could not be found

  An attribute could be anything that you are trying to access after dot operator. It can be a method, property, variable etc.

NoAlertPresentException

- Thrown when switching to no presented alert
- This can be caused by calling an operation on the Alert() class when an alert is not yet on the screen

UnexpectedTagNameException

- Thrown when you try to create an instance of Select class by passing a webelement where the HTML tag is other than **<select>**

COMMON EXCEPTIONS IN SELENIUM

`ElementNotVisibleException`

- 👉 Thrown when an element is present on the DOM, but it is not visible
- 👉 Most commonly encountered when trying to click or edit or read text of an element that is hidden from view

`ElementNotInteractableException`

- 👉 Thrown when an element is present on the DOM but can not interaction with the element
- 👉 Possible cause may be the element is disabled

COMMON EXCEPTIONS IN SELENIUM

`TimeoutException`

- 👉 Usually thrown by until method of WebDriverWait class
- 👉 Possible cause would be when the command does not complete with in specified timeout period

`NoSuchFrameException`

- 👉 Thrown when frame target to be switched doesn't exist

BROWSER AUTOMATION
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COMMON WEBELEMENT METHODS

COMMON WEBELEMENT METHODS

`text`

👉 Returns the text of the element.

`click`

👉 Clicks on the element.

`clear`

👉 Clears the text from the text field if there is any text entry in the filed.

`get_attribute`

👉 Returns the value of the given attribute. If the attribute does not exist, it returns None.

`is_selected`

👉 Returns True if the Checkbox or Radio button is selected. Else, it returns False

COMMON WEBELEMENT METHODS

is_displayed

👉 Returns True if the element is displayed on the webpage, else returns False

is_enabled

👉 Returns True if the element is enabled, else returns False

size

👉 Returns a dictionary of size of the element (height and width).

location

👉 Returns a dictionary of location of the element (x and y co-ordinates)

send_keys

👉 Used to enter a string in the text filed.

COMMON WEBELEMENT METHODS

save_screenshot

👉 Saves a screenshot of the current window to a PNG image file

driver.save_screenshot('./screenshots/sample.png')

screenshot_as_base64

👉 Thrown when frame target to be switched doesn't exist

tag_name

👉 Returns the tag name of the element

rect

👉 Returns a dictionary with size and location of the element

rect

BROWSER AUTOMATION USING PYTHON-SELENIUM

SANDEEP SURYAPRASAD

PYTEST

`unit testing`

What is Unit Testing 🤔

A unit test is a way of testing a unit - the smallest piece of code that can be logically isolated in a system. In most programming languages, that is a function, a subroutine, a method or property.

What do unit tests look like 🤔

A unit can be almost anything you want it to be -- a line of code, a method, or a class. Generally though, smaller is better.

Smaller tests give you a much more granular view of how your code is performing.

There is also the practical aspect that when you test very small units, your tests can be run fast; like a thousand tests in a second fast.

Who Should Create The Unit Tests 🤔

The programmer who wrote the code will likely know how to access the parts that can be tested easily and how to mock objects that can't be accessed otherwise.

PYTEST

`pytest`

What is pytest 🤔

The pytest framework makes it easy to write small tests using Python.

Advantages of pytest

- 👉 Very easy to start with because of its simple and easy syntax.
- 👉 Can run tests in parallel.
- 👉 Can run a specific test or a subset of tests.
- 👉 Dependency test.
- 👉 Grouping of test methods.
- 👉 Generates report.

PYTEST

install pytest

```
pip install pytest
```

check the version of pytest

```
pytest --version
```

test discovery

- 👉 The module name should either start with **test_*** or ***_test**.
- 👉 All the classes inside the module should start from **Test*** (without an `init` method)
- 👉 All the test methods should start from **test_***.

PYTEST

`pytest fixtures`

- 👉 Pytest fixture is a callable (normally a function or a generator) decorated with inbuilt pytest decorator @fixture
- 👉 Fixtures are used for **dependency injection** or **to pass the data to the test functions**
- 👉 Fixtures are accessed by test functions by passing the name of the fixture to test functions as argument.
- 👉 Fixtures are used to run a piece of code repeatedly before and/or after every test method/class/module/session based on the defined scope.

PYTEST

Advantages of fixtures

- 👉 Each test can be run independently irrespective of previous test method is failed or passed
- 👉 Setup and teardown methods run irrespective of test's fail or pass
- 👉 Many tests can share the same setup/teardown
- 👉 **Setup/Teardown** in same function
- 👉 Pass data to test with **return** or **yield** statement

PYTEST

PASSING FIXTURE THAT RETURNS A STRING "HELLO WORLD"

```
from pytest import fixture
@fixture
def greet():
    return "hello world"

# Passing fixture to test method
def test_greet(greet):
    assert "hello world" == greet
```

PASSING FIXTURE AS AN ARGUMENT TO TEST FUNCTION

PASSING FIXTURE THAT RETURNS DRIVER INSTANCE TO THE TEST METHOD

```
from pytest import fixture
from selenium import webdriver

@fixture
def _driver():
  driver = webdriver.Chrome("chromedriver")
  driver.get("http://google.com")
  return driver
```

PASSING FIXTURE AS AN ARGUMENT TO TEST FUNCTION

```
def test_login(_driver):
    _driver.find_element_by_xpath("//a[text()='Log in']").click()
    _driver.find_element_by_id("Email").send_keys("john.doe@company.com")
    _driver.find_element_by_id("Password").send_keys("Password123")
    _driver.quit()
```

PYTEST

SETUP AND **TEARDOWN** METHOD USING FIXTURES

👉 statements **before yield** keyword run's **once before every test function** and statements **after yield** keyword run's **once after every test function**. Thus fixture acting as setup and tear down method.

```
from selenium import webdriver
from pytest import fixture

@fixture
def _driver():
    print('Launcing Browser')
    driver = webdriver.Chrome('chromedriver')
    driver.get("http://demowebshop.tricentis.com/")
    yield driver    # passing driver instance to test method.
    print('Closing Browser')
    driver.quit()

def test_login(_driver):
    _driver.find_element_by_xpath("//a[text()='Log in']").click()
    _driver.find_element_by_id("Email").send_keys("john.doe@company.com")
    _driver.find_element_by_id("Password").send_keys("Password123")
```

PYTEST

`conftest.py (sharing fixtures)`

- Fixtures can be shared or re-used in different test methods and across multiple files through a special python file "`conftest.py`"

- The advantage of having the fixture in "`conftest.py`" is that you don't have to import the fixture you want to use in each and every test. The fixture present in "`conftest.py`" automatically get discovered by pytest.

- Both `conftest.py` and the test module should be in the same package! If `conftest.py` is in other package than the test module, then `conftest.py` module will not be automatically discovered.

- Pytest checks if the `conftest.py` file is present in the **current package**. If it is not present, if checks at the **project level**. If there is a `conftest.py` file at project level, the fixture is automatically discovered.

- The discovery of fixture functions starts at **test classes**, then **test modules**, then **conftest.py** files.

PYTEST

scoping of fixtures

- 👉 "**function**" Called once per test function (default)
- 👉 "**module**" Called once per module
- 👉 "**class**" Called once per class
- 👉 "**session**" Called once per-run

```python
from pytest import fixture

@fixture(scope="session")
def fix_session():
    print('\n running setup SESSION scope')
    yield
    print('\n running teardown SESSION scope')

@fixture(scope="module")
def fix_mod():
    print('\n running setup MODULE scope')
    yield
    print('\n running teardown MODULE scope')

@fixture(scope="class")
def fix_class():
    print('\n running setup CLASS scope')
    yield
    print('\n running teardown CLASS scope')

@fixture()
def fix_func():
    print('\n running setup FUNCTION scope')
    yield
    print('\n running teardown FUNCTION scope')
```

PYTEST

test dependency

- In order make one test method to depend on the test result of another test method, we need to install a plugin **pytest-dependency**
- It allows to mark some tests as dependent from other tests. These tests will then be skipped if any of the dependencies did fail or has been skipped.

```
pip install pytest-dependency
```

- Both the tests are decorated with mark.dependency()
- This will cause the test results to be registered internally and thus other tests may depend on them.

```python
from pytest import mark

@mark.dependency()
def test_login():
    print('logging in')
    assert False

@mark.dependency(depends=["test_login"])
def test_logout():
    print('logging out')
```

```
test_note.py::test_login logging in
FAILED
test_note.py::test_logout SKIPPED

================================================ FAILURES ================================================
_____________________________________________ test_login _____________________________________________

    @mark.dependency()
    def test_login():
        print('logging in')
>       assert False
E       assert False

test_note.py:8: AssertionError
========================================== short test summary info ==========================================
FAILED test_note.py::test_login - assert False
====================================== 1 failed, 1 skipped in 0.24s ======================================
```

SINCE, TEST_LOGIN FUNCTION IS FAILED, PYTEST HAS SKIPPED TEST_LOGOUT FUNCTION

PYTEST

grouping tests

EXECUTES ON THOSE TEST FUNCTIONS MARKED AS ”SMOKE”

```
sandeep@Sandeeps-MacBook-Pro demo % pytest -vs test_note.py -m smoke
============================================================ test session starts ============================================================
platform darwin -- Python 3.8.3, pytest-6.1.0, py-1.9.0, pluggy-0.13.1 -- /Library/Frameworks/Python.framework/Versions/3.8/bin/pyth
on3.8
cachedir: .pytest_cache
metadata: {'Python': '3.8.3', 'Platform': 'macOS-10.16-x86_64-i386-64bit', 'Packages': {'pytest': '6.1.0', 'py': '1.9.0', 'pluggy':
'0.13.1'}, 'Plugins': {'metadata': '1.10.0', 'html': '3.1.1', 'xdist': '2.1.0', 'ordering': '0.6', 'dependency': '0.5.1', 'forked':
'1.3.0'}}
rootdir: /Users/sandeep/Desktop/selenium_training/demo
plugins: metadata-1.10.0, html-3.1.1, xdist-2.1.0, ordering-0.6, dependency-0.5.1, forked-1.3.0
collected 4 items / 2 deselected / 2 selected

test_note.py::test_valiate_login executing login test
PASSED
test_note.py::test_registration executing registration test
PASSED
```

EXECUTES ON THOSE TEST FUNCTIONS MARKED AS ”REGRESSION”

```
sandeep@Sandeeps-MacBook-Pro demo % pytest -vs test_note.py -m regression
============================================================ test session starts ============================================================
platform darwin -- Python 3.8.3, pytest-6.1.0, py-1.9.0, pluggy-0.13.1 -- /Library/Frameworks/Python.framework/Versions/3.8/bin/pyth
on3.8
cachedir: .pytest_cache
metadata: {'Python': '3.8.3', 'Platform': 'macOS-10.16-x86_64-i386-64bit', 'Packages': {'pytest': '6.1.0', 'py': '1.9.0', 'pluggy':
'0.13.1'}, 'Plugins': {'metadata': '1.10.0', 'html': '3.1.1', 'xdist': '2.1.0', 'ordering': '0.6', 'dependency': '0.5.1', 'forked':
'1.3.0'}}
rootdir: /Users/sandeep/Desktop/selenium_training/demo
plugins: metadata-1.10.0, html-3.1.1, xdist-2.1.0, ordering-0.6, dependency-0.5.1, forked-1.3.0
collected 4 items / 2 deselected / 2 selected

test_note.py::test_shopping executing shopping test
PASSED
test_note.py::test_payment executing payment test
PASSED
```

```python
from pytest import mark

@mark.smoke
def test_valiate_login():
    print('executing login test')

@mark.regression
def test_shopping():
    print('executing shopping test')

@mark.regression
def test_payment():
    print('executing payment test')

@mark.smoke
def test_registration():
    print('executing registration test')
```

👉 You can group the tests in using ”**mark**” decorator.

👉 You can provide any meaning full group name.

👉 In the above example, we have two groups, “**smoke**” and “**regression**”

PYTEST

ignoring scripts/tests

```
tests/
|-- example
|   |-- test_example_01.py
|   |-- test_example_02.py
|   '-- test_example_03.py
|-- foobar
|   |-- test_foobar_01.py
|   |-- test_foobar_02.py
|   '-- test_foobar_03.py
'-- hello
    '-- world
        |-- test_world_01.py
        |-- test_world_02.py
        '-- test_world_03.py
```

FOLDER STRUCTURE

```
pytest --ignore=tests/hello/ # Skips all the scripts inside folder "hello"
pytest --ignore=tests/foobar/ --ignore=tests/hello/   # Skips all the scripts inside folder "foobar" and "hello"
pytest --ignore=test_example_01.py  # skips all the tests in module test_exmaple_01.py
```

running only failed scripts

```
pytest --last-failed --last-failed-no-failures none
```

PYTEST

generating reports

- To Generate test results in html format, we need to install a plugin pytest-html
- While running the pytest from terminal, include the following in command line arguments

```
pip install pytest-html
```

COMMAND TO GENERATE HTML REPORT

```
sandeep@Sandeeps-MacBook-Pro demo % pytest test_note.py --html="reports.html"
============================================================ test session starts ============================
============================
platform darwin -- Python 3.8.3, pytest-6.1.0, py-1.9.0, pluggy-0.13.1
rootdir: /Users/sandeep/Desktop/selenium_training/demo
plugins: metadata-1.10.0, html-3.1.1, xdist-2.1.0, ordering-0.6, dependency-0.5.1, forked-1.3.0
collected 4 items


test_note.py ..FF
```

Show all details / Hide all details

Result	Test	Duration	Links
Failed *(hide details)*	test_note.py::test_shopping	0.00	

```
def test_shopping():
        print('executing shopping test')
        # Making test to fail
>       assert True == False
E       assert True == False

test_note.py:17: AssertionError
 -----------------------------Captured stdout call-----------------------------
executing shopping test
```

Failed *(hide details)*	test_note.py::test_payment	0.00	

```
def test_payment():
        print('executing payment test')
        # Making test to fail
>       assert True == False
E       assert True == False

test_note.py:22: AssertionError
 -----------------------------Captured stdout call-----------------------------
executing payment test
```

Passed *(hide details)*	test_note.py::test_valiate_login	0.00	

```
 -----------------------------Captured stdout call-----------------------------
executing login test
```

Passed *(hide details)*	test_note.py::test_registration	0.00	

```
 -----------------------------Captured stdout call-----------------------------
executing registration test
```

PYTEST

passing command line arguments to conftest.py

```python
from selenium import webdriver
from pytest import fixture

def pytest_addoption(parser):
    parser.addoption(
        "--browser", action="store", default="chrome", help="browser type chrome/safari/firefox/edge"
    )

@fixture
def _driver(request):
    browser_type = request.config.getoption("--browser")
    if browser_type.lower() == 'chrome':
        driver = webdriver.Chrome("./chromedriver")
    elif browser_type.lower() == "firefox":
        driver = webdriver.Chrome("./geckodriver")
    elif browser_type.lower() == "edge":
        driver = webdriver.Edge("./geckodriver")
    elif browser_type.lower() == "safari":
        driver = webdriver.Safari()
    else:
        raise NameError('Unknown Browser')
    driver.get("http://demowebshop.tricentis.com/")
    driver.maximize_window()
    yield driver
    driver.close()
```

DEFAULT VALUE

WILL BE IMPLICITLY PASSED BY PYTEST IN RUN-TIME

USAGE

PROBLEMS TERMINAL OUTPUT DEBUG CONSOLE

```
sandeep@Sandeeps-MacBook-Pro training % pytest --browser=firefox
```

PROBLEMS TERMINAL OUTPUT DEBUG CONSOLE

```
sandeep@Sandeeps-MacBook-Pro training % pytest --browser=safari
```

PROBLEMS TERMINAL OUTPUT DEBUG CONSOLE

```
sandeep@Sandeeps-MacBook-Pro training % pytest --browser=edge
```

IF NO ARGUMENT IS PASSED BY DEFAULT CHROME BROWER WILL BE LAUNCHED

PROBLEMS TERMINAL OUTPUT DEBUG CONSOLE

```
sandeep@Sandeeps-MacBook-Pro training % pytest
```

PYTEST

Official Documentation

- 👉 https://docs.pytest.org/en/stable/contents.html
- 👉 https://pytest-dependency.readthedocs.io/en/stable/usage.html
- 👉 https://github.com/pytest-dev/pytest-html

BROWSER AUTOMATION
USING
PYTHON-SELENIUM

SANDEEP SURYAPRASAD

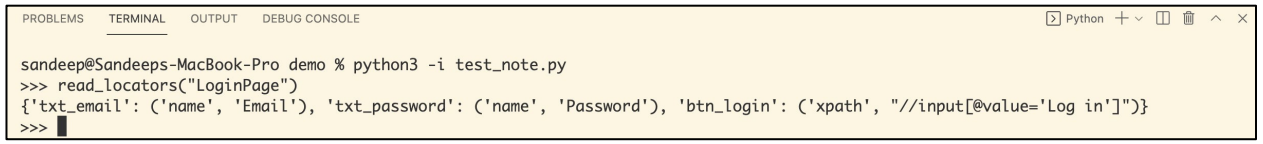
READING EXCEL

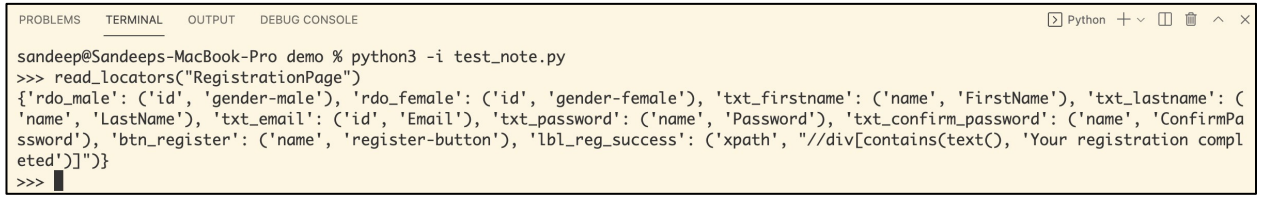
READING EXCEL

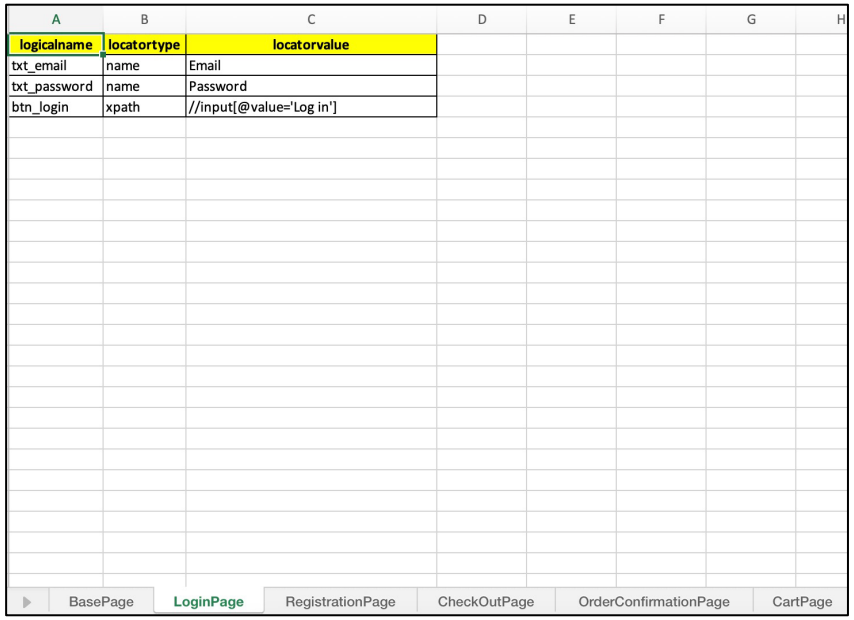
reading locators

```python
import xlrd

def read_locators(sheetname):
    workbook = xlrd.open_workbook("./Objects.xlsx")
    worksheet = workbook.sheet_by_name(sheetname)
    # get_rows() returns a generator
    rows = worksheet.get_rows()
    headers = next(rows)      # Skipping headers
    # Returning a dictionary with Object Name as key and locatortype and locatorvalue as tuple
    return {row[0].value: (row[1].value, row[2].value) for row in rows}
```

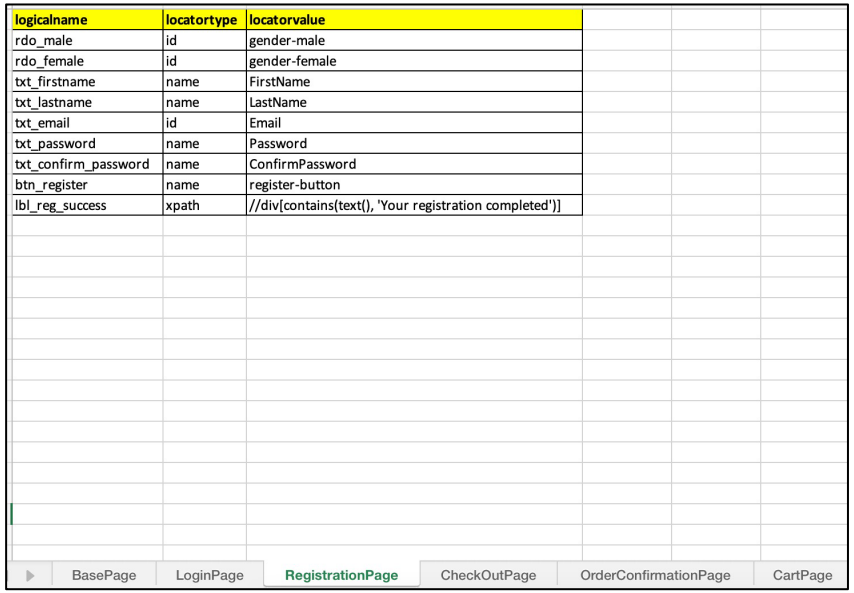






logicalname	locatortype	locatorvalue
txt_email	name	Email
txt_password	name	Password
btn_login	xpath	//input[@value='Log in']

BasePage | LoginPage | RegistrationPage | CheckOutPage | OrderConfirmationPage | CartPage



logicalname	locatortype	locatorvalue
rdo_male	id	gender-male
rdo_female	id	gender-female
txt_firstname	name	FirstName
txt_lastname	name	LastName
txt_email	id	Email
txt_password	name	Password
txt_confirm_password	name	ConfirmPassword
btn_register	name	register-button
lbl_reg_success	xpath	//div[contains(text(), 'Your registration completed')]

BasePage | LoginPage | RegistrationPage | CheckOutPage | OrderConfirmationPage | CartPage

READING EXCEL

reading locators

Login Page POM Class

```
class LoginPage:
    def __init__(self, driver):
        self.driver = driver

    # Read the locator details of all the objects in LoginPage
    loginpage = read_locators("LoginPage")

    def enter_email(self, email):
        self.enter_text(self.loginpage["txt_email"], value=email)

    def enter_password(self, password):
        self.enter_text(self.loginpage["txt_password"], value=password)

    def click_login(self):
        self.click_element(self.loginpage["btn_login"])
```

Registration Page POM Class

```
class RegistrationPage:
    def __init__(self, driver):
        self.driver = driver
    # Read the locator details of all the objects in RegistrationPage
    registrationpage = read_locators("RegistrationPage")

    def select_male(self):
        self.click_element(self.registrationpage["rdo_male"])

    def select_female(self):
        self.click_element(self.registrationpage["rdo_female"])

    def enter_fname(self, fname):
        self.enter_text(self.registrationpage["txt_firstname"], value=fname)

    def enter_lname(self, lname):
        self.enter_text(self.registrationpage["txt_lastname"], value=lname)

    def enter_email(self, email):
        self.enter_text(self.registrationpage["txt_email"], value=email)

    def enter_password(self, password):
        self.enter_text(self.registrationpage["txt_password"], value=password)

    def enter_confirm_password(self, password):
        self.enter_text(self.registrationpage["txt_confirm_password"], value=password)
```

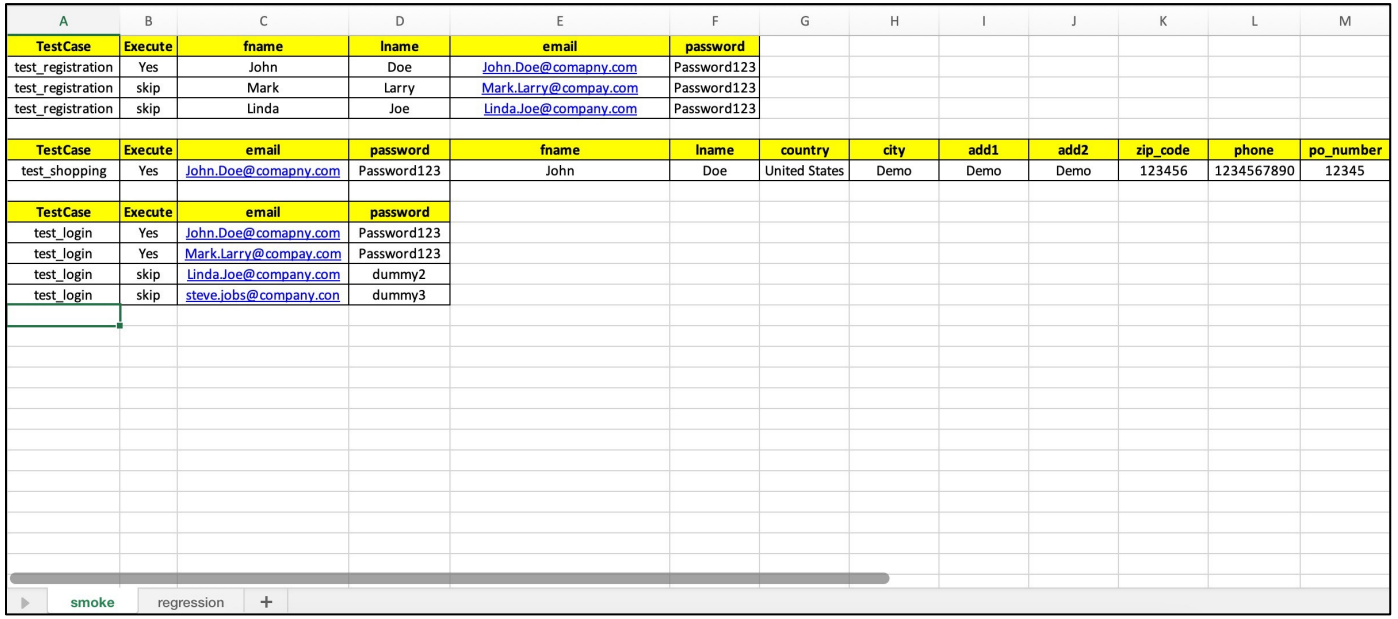
READING EXCEL

reading test data

```
import xlrd

def read_headers(sheetname, testcase):
    workbook = xlrd.open_workbook("./TestData.xlsx")
    worksheet = workbook.sheet_by_name(sheetname)
    rows = worksheet.get_rows()
    for rowno, row in enumerate(rows):
        if row[0].value == testcase:
            temp_data = worksheet.row_values(rowno-1, start_colx=2)
            data = [ item for item in temp_data if item]
            return ','.join(data)

def read_data(sheetname, testcase):
    workbook = xlrd.open_workbook("./TestData.xlsx")
    worksheet = workbook.sheet_by_name(sheetname)
    rows = worksheet.get_rows()
    final_data = [ ]
    for rowno, row in enumerate(rows):
        if row[0].value == testcase:
            temp_data = worksheet.row_values(rowno, start_colx=1)
            data = [ item for item in temp_data if item]
            if data[0] == "Yes":
                final_data.append(tuple(data[1:]))
    return final_data
```



TestCase	Execute	fname	lname	email	password
test_registration	Yes	John	Doe	John.Doe@comapny.com	Password123
test_registration	skip	Mark	Larry	Mark.Larry@compay.com	Password123
test_registration	skip	Linda	Joe	Linda.Joe@company.com	Password123

TestCase	Execute	email	password	fname	lname	country	city	add1	add2	zip_code	phone	po_number
test_shopping	Yes	John.Doe@comapny.com	Password123	John	Doe	United States	Demo	Demo	Demo	123456	1234567890	12345

TestCase	Execute	email	password
test_login	Yes	John.Doe@comapny.com	Password123
test_login	Yes	Mark.Larry@compay.com	Password123
test_login	skip	Linda.Joe@company.com	dummy2
test_login	skip	steve.jobs@company.con	dummy3

smoke regression +

READING EXCEL

reading test data

Login script

```
headers = read_headers("smoke", "test_login")
data = read_data("smoke", "test_login")

@mark.parametrize(headers, data)
def test_login(_driver, email, password):
    lp = LoginPage(_driver)
    lp.base_click_login()
    lp.login_enter_email(email)
    lp.login_enter_password(password)
    lp.login_click_login()
```

Registration script

```
headers = read_headers("Registration", "test_registration")
data = read_data("Registration", "test_registration")

@mark.parametrize(headers, data)
def test_registration(_driver, fname, lname, email, password):
    rp = RegistraionPage(_driver)
    rp.base_click_register()
    rp.register_select_male()
    rp.register_enter_firstname(fname)
    rp.register_enter_lastname(lname)
    rp.register_enter_email(email)
    rp.register_enter_password(password)
    rp.register_enter_confirm_password(password)
    rp.register_click_register()
```

BROWSER AUTOMATION
USING
PYTHON-SELENIUM

PAGE OBJECT MODEL

SANDEEP SURYAPRASAD

PAGE OBJECT MODEL

POM

- Design patterns are formalized **best practices** that the programmer can use to solve common problems when **developing/testing** an application or system.
- In software engineering, a software design pattern is a general, reusable solution to a commonly occurring problem within a given context in software design.
- Page Object is a Design Pattern which has become popular in test automation for enhancing test maintenance and reducing code duplication.
- A page object is an object-oriented class that serves as an interface to a page of your AUT.
- The tests then use the methods of this page object class whenever they need to interact with the UI of that page.
- The benefit is that if the UI changes for the page, the tests themselves don't need to change, only the code within the page object needs to change. Subsequently all changes to support that new UI are located in one place.

PAGE OBJECT MODEL

Problems without POM

- There is no separation between the test method and the AUT's (Application Under Test) locators (IDs in this example); both are intertwined in a single method. **If the AUT's UI changes its identifiers, orlayout, or if the login flow is changed, the test itself must changed to reflect the change in login flow.**

- The **ID attribute would be spread in multiple tests,** in all tests that had to use this login page. **If the value of the ID attribute changes, ID attribute needs to be changed in all the scripts.**

Login test without POM

```
def test_login():
    # Click on Register link on Demowebshop Home Page
    driver.find_element_by_link_text("Log in").click()
    # Enter Email
    driver.find_element_by_id("Email").send_keys("Test.User@company.com")
    # Enter Password
    driver.find_element_by_id("Password").send_keys("Test_Password")
    # Click on Login Button
    driver.find_element_by_xpath("//input[@value='Log in']").click()
```

PAGE OBJECT MODEL (Locators and data maintained in excel)

POM design

Login Page POM Class

```
class LoginPage:
    def __init__(self, driver):
        self.driver = driver

    # Read the locator details of all the objects in LoginPage
    loginpage = read_locators("LoginPage")

    def enter_email(self, email):
        self.enter_text(self.loginpage["txt_email"], value=email)

    def enter_password(self, password):
        self.enter_text(self.loginpage["txt_password"], value=password)

    def click_login(self):
        self.click_element(self.loginpage["btn_login"])
```

Registration Page POM Class

```
class RegistrationPage:
    def __init__(self, driver):
        self.driver = driver
    # Read the locator details of all the objects in RegistrationPage
    registrationpage = read_locators("RegistrationPage")

    def select_male(self):
        self.click_element(self.registrationpage["rdo_male"])

    def select_female(self):
        self.click_element(self.registrationpage["rdo_female"])

    def enter_fname(self, fname):
        self.enter_text(self.registrationpage["txt_firstname"], value=fname)

    def enter_lname(self, lname):
        self.enter_text(self.registrationpage["txt_lastname"], value=lname)

    def enter_email(self, email):
        self.enter_text(self.registrationpage["txt_email"], value=email)

    def enter_password(self, password):
        self.enter_text(self.registrationpage["txt_password"], value=password)

    def enter_confirm_password(self, password):
        self.enter_text(self.registrationpage["txt_confirm_password"], value=password)
```

Login script

```
headers = read_headers("smoke", "test_login")
data = read_data("smoke", "test_login")

@mark.parametrize(headers, data)
def test_login(_driver, email, password):
    lp = LoginPage(_driver)
    lp.base_click_login()
    lp.login_enter_email(email)
    lp.login_enter_password(password)
    lp.login_click_login()
```

Registration script

```
headers = read_headers("Registration", "test_registration")
data = read_data("Registration", "test_registration")

@mark.parametrize(headers, data)
def test_registration(_driver, fname, lname, email, password):
    rp = RegistraionPage(_driver)
    rp.base_click_register()
    rp.register_select_male()
    rp.register_enter_firstname(fname)
    rp.register_enter_lastname(lname)
    rp.register_enter_email(email)
    rp.register_enter_password(password)
    rp.register_enter_confirm_password(password)
    rp.register_click_register()
```

PAGE OBJECT MODEL (Locators maintained in POM class)

POM design

HomePage POM Class

```python
from selenium_wrapper import SeleniumWrapper
from selenium.common.exceptions import NoSuchElementException
from time import sleep

class HomePage(SeleniumWrapper):
    _lnk_register = ("xpath", "//a[text()='Register']")
    _lnk_login  = ("xpath", "//a[text()='Log in']")
    _lnk_logout = ("xpath", "//a[text()='Log out']")

    def click_register(self):
        self.click_element(self._lnk_register)

    def click_login(self):
        self.click_element(self._lnk_login)

    def click_logout(self):
        self.click_element(self._lnk_logout)

    def is_user_logged_in(self, email):
        for _ in range(10):
            try:
                print(f'Trying to find element with link text {email}')
                return self.driver.find_element("xpath", f"//a[text()='{email}']").is_displayed()
            except NoSuchElementException:
                sleep(1)
                continue
        return False
```

LoginPage POM Class

```python
from selenium_wrapper import SeleniumWrapper

class LoginPage(SeleniumWrapper):
    # Class Variables
    _txt_email = ("id", "Email")
    _txt_password = ("id", "Password")
    _btn_login = ("xpath", "//input[@value='Log in']")

    def enter_email(self, email):
        self.enter_text(self._txt_email, value=email)

    def enter_password(self, password):
        self.enter_text(self._txt_password, value=password)

    def click_login(self):
        self.click_element(self._btn_login)
```

PAGE OBJECT MODEL (Test Data maintained in the test script)

POM design

RegistationPage POM Class

```python
from selenium_wrapper import SeleniumWrapper

class RegistrationPage(SeleniumWrapper):
    _rdo_male = ("id", "gender-male")
    _rdo_female = ("id", "gender-female")
    _txt_fname = ("id", "FirstName")
    _txt_lname = ("id", "LastName")
    _txt_email = ("id", "Email")
    _txt_password = ("id", "Password")
    _txt_confirm_password = ("id", "ConfirmPassword")
    _btn_register = ("id", "register-button")

    def select_male(self):
        self.click_element(self._rdo_male)

    def select_female(self):
        self.click_element(self._rdo_female)

    def enter_fname(self, fname):
        self.enter_text(self._txt_fname, value=fname)

    def enter_lname(self, lname):
        self.enter_text(self._txt_lname, value=lname)

    def enter_email(self, email):
        self.enter_text(self._txt_email, value=email)

    def enter_password(self, password):
        self.enter_text(self._txt_password, value=password)

    def enter_confirm_password(self, password):
        self.enter_text(self._txt_confirm_password, value=password)

    def click_register(self):
        self.click_element(self._btn_register)
```

Login script →

```python
from loginpage import LoginPage
from homepage import HomePage
from pytest import mark

headers = "email,password"
data = [("bill.gates@company.com", "Password123"), ("steve.jobs@company.con", "Password123")]

@mark.parametrize(headers, data)
def test_login(_driver, email, password):
    # Click on Login Link
    hp = HomePage(_driver)
    hp.click_login()

    # Login
    lp = LoginPage(_driver)
    lp.enter_email(email)
    lp.enter_password(password)
    lp.click_login()
    assert hp.is_user_logged_in(email) == True
```

Registration script →

```python
from registrationpage import RegistrationPage
from homepage import HomePage
from pytest import mark

headers = "gender,firstname,lastname,email,password"
data = [("male", "steve", "jobs", "steve.jobs@company.com", "Password123"),
        ("female", "bill", "gates", "bill.gates@company.con", "Password123")]

@mark.parametrize(headers, data)
def test_registration(_driver, gender, firstname, lastname, email, password):
    hp = HomePage(_driver)
    hp.click_register()

    rp = RegistrationPage(_driver)
    if gender == "male":
        rp.select_male()
    else:
        rp.select_female()

    rp.enter_fname(firstname)
    rp.enter_lname(lastname)
    rp.enter_email(email)
    rp.enter_password(password)
    rp.enter_confirm_password(password)
    rp.click_register()
```

THE END!